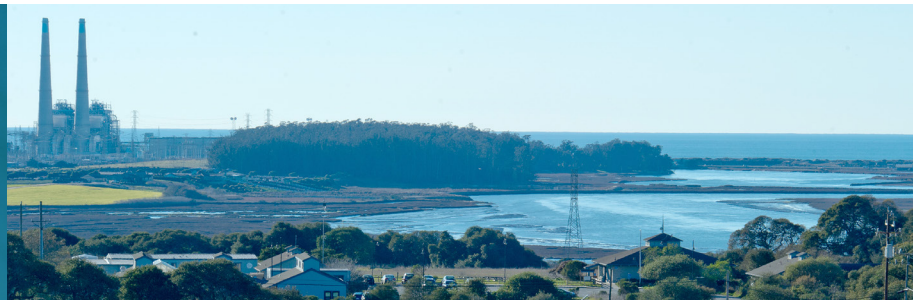
Roadmap For Action



Elkhorn Slough at Moss Landing. The recently expanded Moss Landing Power Plant, the California Coastal Conservancy's purchase of land adjacent to Elkhorn Slough to increase land in public trust, and high-value managed strawberry crops all are the result of diverse, highly planned actions.

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About This Chapter

Chapter 8 provides the *California Water Plan Update 2013* (Update 2013) roadmap to implement integrated water management (IWM) actions. The roadmap considers immediate and changing conditions and priorities, and the ongoing challenges described earlier in Volume 1, and particularly in Chapter 2, "Imperative to Invest in Innovation and Infrastructure." This chapter presents the elements of the roadmap, namely the vision of sustainable and reliable water resources and management systems. The mission statements herein describe collaborative efforts to prepare for California's most pressing statewide and regional water management issues and challenges, the seven goals that set forth the desired outcomes of the California Water Plan (CWP), and the 10 guiding principles that express the core values and philosophies for how the vision, mission, and goals will be achieved.

Update 2013 identifies seventeen objectives and their 300-plus related actions and sub-actions geared toward fulfilling the vision, mission, goals, and principles. Performance measures to gauge progress on those related actions are also specified. (For further discussion regarding these elements, see Box 8-1 and Volume 4, *Reference Guide*, the article "Strategic Planning Guidelines.") The Update 2013 roadmap builds on accomplishments since *California Water Plan Update 2009* (Update 2009), including ongoing implementation of the 2009 comprehensive water legislation, as well as fundamental water-resource management lessons learned. The roadmap includes near-term and long-term actions that describe how Californians can and should step up existing efforts and initiate new ones to provide integrated, reliable, sustainable, and secure water resources and management systems. These efforts will protect public health, public safety, and ecosystems, as well as ensure the stability of the state's economy, today and for future generations.

Background

Required by the California Water Code Section 10005(a), the CWP is State government's strategic plan for managing and developing water resources statewide. By statute the CWP cannot mandate actions or authorize spending for the related actions. Update 2013 makes neither project-specific nor site-specific recommendations; therefore, it does not include environmental review and documentation as would be required by the California Environmental Quality Act (CEQA).

Policy-makers and lawmakers must take definitive steps to authorize the related actions in Update 2013 and appropriate the funding needed for their implementation. At the same time, the plan must be embraced by agencies, voting bodies, and non-profit organizations that can implement the related actions. This underscores the need to have broad public participation and support to realize the Update 2013 objectives and related actions.

Update 2013 builds on and advances a planning transformation that began with the *California Water Plan Update 2005* (Update 2005) process. Update 2005 was the first of the CWP updates to explicitly include a strategic planning approach from preparation to presentation. Since then, the CWP has become a strategic planning document that more fully describes the role of State

Box 8-1 Elements of the Strategic Plan

Element	Purpose
Vision	The vision statement describes the desired future for California water resources and management, and serves as a foundation for water and flood planning during the planning horizon.
Mission	The mission statement describes the California Water Plan's unique purpose and its overarching reason for existence. The plan identifies what needs to be done and why, and how Californians will benefit from the proposed actions.
Goals	The goals are the desired outcome of the water plan over its planning horizon. The goals are founded on the statewide vision. Meeting the goals requires coordination among federal, State, tribal, and local governments and agencies.
Guiding Principles	The guiding principles describe the core values and philosophies that dictate how to achieve the vision, mission, and goals. In other words, the guiding principles describe how to make decisions and do business.
Objectives	Each objective targets what needs to be done and why, to accomplish one or more goals.
Related Actions	Related actions tell how an objective will be achieved. They describe specific actions in measurable, time-based statements of intent. They emphasize the results of actions at the end of a specific time frame. Some related actions must be undertaken by State government or communities over whom the California Department of Water Resources has no authority. In these cases, performance measures and time frames must be part of the entities' own strategic plans.
Performance Measures	Performance measures describe what to measure and the method by which to measure, to determine what work was performed and what results were achieved. Performance measures may be short term, intermediate, or long term and can help with accountability and comparisons of how well an action has met a desired goal or objective.

government and the growing role of California's regional collaboratives in managing the state's water resources.

Elements of the Roadmap

The vision, mission, goals, guiding principles, objectives, and related actions build on those presented in Update 2009. In addition, Update 2013 includes four new objectives reflecting important water management topics. These include objectives that promote enhancing public access to waterways, lakes, and beaches; strengthening alignment between land use and water planning; strengthening government agency alignment; and improving water financing. While some related actions for the various objectives were carried over from Update 2009, many were revised or are new for Update 2013.

Vision

California has healthy, resilient watersheds and reliable and secure water resources and management systems. Public health, safety, and quality of life in rural, suburban, and urban communities are significantly improved as a result of advancements in IWM. The water system provides the certainty needed for quality of life, sustainable economic growth, business vitality, and agricultural productivity. California's unique biological diversity, ecological values, and cultural heritage are protected and have substantially recovered.

Mission

Updating the CWP provides federal, State, tribal, regional, and local governments and organizations with a continuous planning forum to collaboratively:

- Recommend strategic goals, objectives, and near-term and long-term actions that would conserve, manage, develop, and sustain California's watersheds, water resources, and management systems.
- Prepare response plans for floods, droughts, and catastrophic events that would threaten water resources and management systems, the environment, and property, as well as the health, welfare, and livelihood of the people of California.
- Evaluate current and future watershed and water conditions, challenges, and opportunities.

Goals

1. California's water supplies are adequate, reliable, secure, affordable, sustainable, and of suitable quality for beneficial uses to protect, preserve, and enhance watersheds, communities, cultural resources and practices, environmental and agricultural resources, and recreation.

2. State government supports integrated water resources planning and management through leadership, assistance, oversight, and public funding.

3. Regional and interregional partnerships play a pivotal role in California water resources planning, water management for sustainable water use and resources, and increasing regional self-reliance.

4. Water resource and land use planners make informed and collaborative decisions and implement integrated actions to increase water supply reliability, use water more efficiently, protect water quality, improve flood protection, promote environmental stewardship, and ensure environmental justice and public access to water bodies, in light of drivers of change and catastrophic events.

5. California is prepared for climate uncertainty by developing adaptation strategies and investing in a diverse set of actions that reduce the risk and consequences posed by climate change, which make the system more resilient to change and increase the sustainability of water and flood management systems and the ecosystems they depend on.

6. Integrated flood management, as a part of IWM, increases flood protection, improves preparedness and emergency response, enhances floodplain ecosystems, and promotes sustainable flood management systems.

7. The benefits and consequences of water decisions and access to State government resources are equitable across all communities.

Guiding Principles

1. **Manage California's water resources and management systems with ecosystem health and water supply and quality reliability as equal goals, with full consideration of public trust uses.** Healthy, functioning ecosystems and reliable, quality water supplies are primary and equal goals for water management to help sustain water resources and management systems. Protect public trust uses whenever feasible, and consider public trust values in the planning and allocation of water resources. State government protects the public's rights to commerce, navigation, fisheries, recreation, ecological preservation, and related beneficial uses, including those of its Native American tribes and other communities that depend on these resources for subsistence and cultural practices.

2. **Use a broad, stakeholder-based, long-view perspective for water management.** Promote multi-objective planning with a regional focus, and coordinate local, regional, interregional, and statewide initiatives. Recognize distinct regional problems, resources, assets, and priorities. Emphasize long-term planning (30- to 50-year horizon) while identifying near-term actions needed to achieve the plan.

3. **Promote sustainable resource management on a watershed basis.** Wisely use natural resources to ensure their availability for future generations. Promote activities with the greatest multiple benefits regionally and statewide. Consider the interrelationship between water uses and supplies, water conservation, water quality, water infrastructure, flood protection, land use, energy generation and consumption, recreation, economic prosperity, and environmental stewardship on a watershed or ecosystem basis.

4. **Increase system flexibility and resiliency.** Evaluate and implement strategies that reduce the impacts of droughts and floods in the region. In California, drought contingency planning and integrated flood management are important components of regional water planning.

5. **Increase regional self-reliance.** Implement resource management strategies that reduce dependence on long-term imports of water from other hydrologic regions for meeting additional future water demands and during times of limited supply, such as a drought or interrupted supply after a catastrophic event (e.g., an earthquake or fire). Reduce reliance on the Sacramento-San Joaquin Delta (Delta) in meeting California's future water demands. Increase regional self-reliance for water by investing in water use efficiency, water recycling, advanced water technologies, local and regional water-supply projects, improved regional coordination of local and regional water supplies, and other strategies. As part of a diverse water portfolio, short-term water transfers between regions that are environmentally, economically, and socially sound can also help increase regional self-reliance overall.

6. **Determine values for economic, environmental, and social benefits; costs; and tradeoffs so as to base investment decisions on sustainability indicators.** Evaluate programs and projects recognizing economic growth, environmental quality, social equity, and sustainability as coequal objectives. When comparing alternatives, determine the value of potential economic, environmental, and social benefits; beneficiaries; costs; and tradeoffs. Include a plan that avoids, minimizes, and mitigates for adverse impacts of IWM projects.

7. **Incorporate future variability, uncertainties, and risk in the decision-making process.** Use multiple future scenarios to consider drivers of change and emerging conditions, such as population growth, land use development patterns, and climate change, when making planning, management, and policy decisions.

8. **Apply California's water rights laws, including the long-standing constitutional principles of reasonable use and public trust, as the foundation for public policy-making, planning, and management decisions on California water resources.** Recognize that certain natural resources — including water, tides, and submerged lands; the beds and banks of navigable rivers; and fish and wildlife resources — are owned by the public and held in trust for present and future generations of Californians. Native American tribes also depend on these natural resources for subsistence and cultural heritage. Effectively applying existing water rights laws and the twin principles of reasonable use and public trust will provide water for future generations while protecting ecosystem values.

9. **Promote environmental justice — the fair treatment of people of all races, cultures, and incomes.** Include meaningful community participation in decision-making for State-sponsored or public-funded resource management projects, and consider such factors as community demographics, potential or actual adverse health or environmental impacts, and benefits and burdens of the project on communities.

10. **Use science, best data, and local and traditional ecological knowledge in a transparent and documented process.** When appropriate and possible, use data, information, planning methods, and analytical techniques that have undergone scientific review.

Objectives and Related Actions

The objectives and related actions presented in this roadmap were developed in part from companion State plans and the Tribal Engagement Plan (refer to Chapter 4, "Strengthening Government Alignment"). Meeting the 17 objectives, shown in Box 8-2, will help achieve Update 2013 goals. Planning and investing in the more than 300 related actions and sub-actions will provide greater system resiliency and help California deal with climate conditions and other future uncertainties and risks.

In addition, performance measures, lead entities, the current funding status, and whether legislation is required to complete the related action have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action. (Note that numbering of the objectives and related actions, below, is for ease of identification and does not represent priority.)

Box 8-2 Update 2013 Objectives

1. Strengthen Integrated Regional Water Management
2. Use and Reuse Water More Efficiently
3. Expand Conjunctive Management of Multiple Supplies
4. Protect and Restore Surface Water and Groundwater Quality
5. Practice Environmental Stewardship
6. Improve Flood Management Using an Integrated Water Management Approach
7. Manage the Delta to Achieve the Coequal Goals for California
8. Prepare Prevention, Response, and Recovery Plans
9. Reduce the Carbon Footprint of Water Systems and Water Uses
10. Improve Data, Analysis, and Decision-Support Tools
11. Invest in Water Technology and Science
12. Strengthen Tribal/State Relations and Natural Resources Management
13. Ensure Equitable Distribution of Benefits
14. Protect and Enhance Public Access to the State's Waterways, Lakes, and Beaches
15. Strengthen Alignment of Land Use Planning and Integrated Water Management
16. Strengthen Alignment of Government Processes and Tools
17. Improve Integrated Water Management Finance Strategy and Investments

Note: Subsequently in this chapter, the discussion of each objective, accompanied by its list of related actions, begins on a new page to facilitate the extraction of selected pages by using the "Page Thumbnail" view in Adobe Acrobat®.

Objective 1 — Strengthen Integrated Regional Water Management

> *Strengthen integrated regional water management planning and implementation to maintain and enhance regional water management partnerships and improve regional self-reliance.*

Integrated regional water management (IRWM) is the application of IWM principals at the regional scale to improve public safety, environmental stewardship, and economic stability. IRWM is based on regional water managers and resource planners being best suited and best positioned to manage regional and local water resources to meet regional needs.

The State of California officially embraced IRWM in 2002 with the passage of the IRWM Planning Act (Senate Bill [SB] 1672). The purpose of the act is to:

> …facilitate the development of integrated regional water management plans, thereby maximizing the quality and quantity of water available to meet the state's water needs by providing a framework for local agencies to integrate programs and projects that protect and enhance regional water supplies.

The act encourages:

> …local agencies to work cooperatively to manage their available local and imported water supplies to improve the quality, quantity and reliability of those supplies.

The IRWM Planning Act was followed by the passage of Proposition 50 (2002) and Proposition 84 (2006), which provided $500 million and $1.0 billion, respectively, to support IRWM planning and implementation. State guidelines for the practice of IRWM encourage IRWM planning efforts to be open, inclusive, transparent, and collaborative. IRWM planning processes should include water managers; tribes; local, regional, State, and federal governmental agencies; disadvantaged communities; and non-governmental organizations.

IRWM has profoundly improved water management in California since 2002. There are currently 48 IRWM regions in California that collectively cover about 87 percent of the state's geographic area and 99 percent of the state's population. Although much progress has been made, many opportunities remain for even greater advancement of IRWM and its benefits.

The California Department of Water Resources (DWR) is working with IRWM practitioners and stakeholders to develop the Strategic Plan for the Future of Integrated Regional Water Management in California (IRWM Strategic Plan). The purpose of the IRWM Strategic Plan is to develop a shared vision for the future of IRWM in California and identify measures necessary to achieve the desired future. The plan will:

- Inform the California Legislature about statutory changes needed to sustain IRWM.
- Describe DWR's future role and guide DWR's actions for improving its support of IRWM.
- Recommend to federal, State, and local agencies better alignment of programs and policies to more effectively support IRWM goals.
- Identify for regional water management groups options, tools, and practices for improving the practice of IRWM.

- Inform the general public about the benefits of, and opportunities for, involvement in the IRWM process.

Development efforts for the IRWM Strategic Plan are currently underway and are expected to be completed in 2014. Three principal themes have emerged from stakeholder input and will likely be part of the plan:

- Improve the IRWM process.
- Improve water management tools.
- Align government statutes, regulations, programs, and policies to support IRWM.

Because the IRWM Strategic Plan is a companion State plan for Update 2013, these themes and related actions, including those yet to be determined, are included in this objective. Additional information on the development of the IRWM Strategic Plan is available at http://www.water.ca.gov/irwm/stratplan/.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

1.1 The California Department of Water Resources (DWR), through active engagement with agencies, tribes, communities, and stakeholders, will complete the Strategic Plan for the Future of Integrated Regional Water Management (IRWM) in California in 2014.

1.2 DWR and other State agencies should encourage and support regional water management groups to continue, enhance, and expand their regional collaboration and cooperation through IRWM to meet the water management challenges of population growth and climate change, and ensure public safety, environmental stewardship, and economic stability.

1.3 DWR should continue to improve the efficiency and effectiveness of its future IRWM grant programs and processes in coordination with other State agencies and regional water management groups.

1.4 DWR and other State agencies should improve IRWM processes at all levels to encourage broad participation, support collaboration, and facilitate cooperation among stakeholders.

1.5 DWR should perform a needs assessment for under-represented groups and develop strategies for better inclusion of those groups in IRWM.

1.6 DWR and other State agencies should develop and support an IRWM education and awareness program to foster public support and facilitate informed decisions for sustainable water management.

1.7 DWR and other State agencies should improve water management tools, provide technical assistance, and encourage innovation in the areas of collaboration, trade-off analyses, modeling, and data management.

1.8 State government should align its statutes, regulations, programs, policies, and practices to support and strengthen IRWM.

Objective 2 — Use and Reuse Water More Efficiently

Use water more efficiently with significantly greater water conservation, recycling, and reuse to help meet future water demands and adapt to climate change.

Urban and agricultural water use efficiency are important tools for meeting current and future water demands and maximizing beneficial use of the state's water resources. To minimize the impacts on California's natural environment, recover groundwater overdraft, and support meeting statewide and local water demands, our cities and farms must continue to increase water use efficiency and thus maximize benefits from existing and future water supplies. Efficient water use in agriculture must go hand in hand with the adoption of agricultural land stewardship strategies (see Volume 3, Chapter 21, "Agricultural Land Stewardship"), so as to realize multiple benefits and ensure a sustainable food production while protecting and restoring the natural and human environments. Californians have been successful in increasing water-use efficiency measures, such as low-water-use landscaping, water-efficient appliances, and municipal wastewater recycling; however, increasing population and climate change impacts require continued aggressive focus and investment in water-use efficiency efforts.

Key components of California's actions to increase water use efficiency are contained within the 2009 Comprehensive Water Package (SB X7-7), which requires urban water agencies to reduce statewide per capita water consumption 20 percent by 2020 and make incremental progress toward this goal by reducing per capita water use by at least 10 percent on or before December 31, 2015. The bill also requires agricultural water suppliers to measure water deliveries and adopt a pricing structure for water customers based in part on quantity delivered, and, where technically and economically feasible, to implement additional measures to improve efficiency.

Water use efficiency is a fundamental component of California water planning because it integrates and benefits key components of water supply planning and environmental stewardship. It is a key part of the water management portfolio of every water agency, city, county, farm, and business, including State and federal government agencies. Water use efficiency and conservation reduce water demand and, in turn, wastewater generation. This reduces water and wastewater treatment needs, thereby reducing energy demand and greenhouse gas (GHG) emissions. Efficient water use also includes the development of local water supplies, which has the dual benefit of reducing energy demands for water transportation and reducing reliance on water supplies that may be strongly influenced by fluctuating availability. Efficient water use also matches water quality to water use ("fit for use"), primarily to identify water reuse opportunities that minimize the need for high-level and energy-intensive treatment. While these water management issues have statewide impacts, they are primarily implemented at the local and regional levels.

The related actions identified below are specific measures that can be implemented during the term of Update 2013 to support this objective of using and reusing water more efficiently. They focus on increased water education to continue to raise awareness of the need for all Californians to be efficient with use of our shared resource; development of agricultural and urban water plans, tools, and metrics; and preparation of a statewide recycled water strategic plan.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information

is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action. These related actions are also supported by additional recommendations in Chapter 2, "Agricultural Water Use Efficiency"; Chapter 3, "Urban Water Use Efficiency"; and Chapter 12, "Municipal Recycled Water," of Volume 3, *Resource Management Strategies*.

Related Actions

2.1 State government should expand public information efforts to promote water conservation in both the urban and agricultural sectors to better inform all Californians about the importance and value of water and about ways to use water more efficiently. The expanded campaign should be designed with specific informational goals and objectives and should operate on a continuous basis in wet years as well as dry years. This campaign will assist local water suppliers and the State in achieving the 2020 urban water use targets.

2.2 State government should establish a water-use-efficiency and alternative-water-supply science and technology program to accelerate the research, development, testing, pilot projects, and commercialization of promising new technologies and techniques to improve agricultural and urban water management and use efficiency. The program should conduct studies in all sectors of water use, including agriculture, municipal and industrial, and in the alternative water supply areas of municipal recycled water, gray water, stormwater capture, and desalination. The program's level of sponsored research should match that of the State's energy-use efficiency research programs.

2.3 The California Department of Water Resources (DWR), in cooperation with agricultural and urban water-use communities, should conduct a study to identify the barriers, costs, and technical assistance required to establish standard agricultural and urban water-use classifications and data standards for water use reporting statewide. The standard classifications would provide more detailed and accurate reporting of California water uses, and allow for water supplier data to be more accurately aggregated at regional and statewide scales for the five-year updates of the California Water Plan.

2.4 DWR should continue to work with the University of California and the California State University systems to refine irrigation strategies and systems that reduce the impact of extreme water shortage conditions (e.g., drought) on California's agriculture. State government should provide more technical assistance to growers to improve on-farm irrigation efficiency, and should expand the California Irrigation Management Information System (CIMIS) network (including remote sensing technology, satellite imagery, etc.), mobile laboratory services, and other water management training and education programs.

2.5 DWR, in cooperation with academic institutions, resource conservation districts, and independent crop advisors, should provide technical assistance to agricultural water suppliers and farmers to implement efficient water management practices (EWMPs) and to evaluate their agricultural water-use efficiency by applying the quantification methods (indicators) described in the 2012 DWR report to the Legislature, "A Proposed Methodology for Quantifying the Efficiency of Agricultural Water Use." Agricultural water suppliers with irrigated acreage equal or greater than 25,000 acres should utilize these methods to quantify and report efficiency improvements in their agricultural water management plans (AWMPs).

2.6 Agricultural and urban water suppliers should report water supply system leakage and spills in their water management plans. Agricultural suppliers should measure and report canal seepage and district outflows. Urban water suppliers should calculate and report unaccounted-for distribution system water.

2.7 DWR, with the California Urban Water Conservation Council and the State Water Resources Control Board (SWRCB), should research, develop, and promote water rate structures that provide customers a water conservation price signal while maintaining needed infrastructure and revenue stability for the water utilities.

2.8 To better educate customers on the appropriate use of water and to improve landscape irrigation efficiency, DWR should research new approaches for measuring landscape area to assist water suppliers in developing customer-specific water budgets. In addition to educational purposes, urban water suppliers should use water budgets to focus their water conservation rebates and programs on those customers using water excessively.

2.9 State government should develop a 2030 Statewide Urban Water Use Efficiency Plan with the goal of further improvements in water use efficiency from the 20x2020 program. Accounting for population growth, the current 20x2020 program will keep the total volume of urban water use in 2020 at about the same as in the year 2000. The goal of the 2030 program should be to replicate the 20x2020 program success by keeping the total volume of statewide urban water use in 2030 at the same level as in 2020, achieved by further reducing per-capita urban water use.

2.10 DWR, with the SWRCB and California Department of Public Health, should prepare a California Municipal Water Recycling Strategic Plan to guide expanded statewide use of recycled water to help sustain statewide water supplies. The strategic plan should include:

- Review and status of implementation of the 2003 Recycled Water Task Force findings.
- Regional assessment and quantification of current and proposed recycled water capacities and demands.
- Evaluation of better alignment of the appropriate level of treatment required for the planned recycled water use in agricultural and environmental applications to create more opportunities for recycled water use and reduce the energy required to produce recycled water.
- Consideration of potential groundwater degradation issues and coordination with Salt and Nutrient Management Plan implementation.
- Regional evaluation of barriers to additional recycled water use and proposing solutions, including indirect and direct potable reuse issues and opportunities, to support continued expansion of recycled water use.

2.11 All levels of government should establish policies and provide incentives to promote better urban runoff management and reuse. Urban and, where feasible, rural communities should invest in facilities to capture, store, treat, and use urban stormwater runoff, such as percolation to usable aquifers, underground storage beneath parks, small surface basins, in drains, or the creation of catch basins or sumps downhill of development. Depending on the source and application, captured stormwater may be suitable for use without additional treatment, or it may be blended to augment local supplies.

Objective 3 — Expand Conjunctive Management of Multiple Supplies

Advance and expand conjunctive management of multiple water supply sources with existing and new surface and groundwater storage to prepare for future droughts, floods, and climate change.

California can prepare for future droughts, flood, and climate change, as well as improve water supply reliability and water quality, by managing the extensive water storage capacity of groundwater basins in closer coordination with existing and new surface storage and other water supply sources when available. The other supply sources include, but are not limited to, recycled municipal water, surface runoff and flood flows, urban runoff and stormwater, imported water, water transfers, and desalination of brackish and sea water.

Surface and groundwater resources must be managed much more conjunctively when feasible to meet the challenges of climate change. Additional water storage and conveyance improvements are also necessary to provide better flood management, water quality, and system reliability in response to daily and seasonal variations and uncertainties in water supply and use, and to facilitate water transfers within and among regions.

During droughts, California has historically depended on its groundwater. However, many aquifers are contaminated, requiring remediation if they are to be used as viable water banks. Moreover, groundwater resources will not be immune to climate change; in fact, historical patterns of groundwater recharge may change considerably as a result of climate change. Because droughts may be exacerbated by climate change, more efficient groundwater basin management will be necessary to minimize additional groundwater depletion and to utilize opportunities to store water underground and substantially reduce existing overdraft.

Along with more effective use of groundwater storage, better regional and systemwide water management and the reoperation of surface storage reservoirs and related infrastructure of flood and water management systems can provide many benefits in a changing climate. These include capturing higher peak flows to protect beneficial uses of water, such as protecting drinking water quality, providing cold water releases for fish, preventing seawater intrusion, generating clean hydroelectricity, providing recreational opportunities in a warmer climate, and offsetting the loss of snowpack storage by facilitating increased storage of water above and below the ground.

System reoperation of existing flood and water infrastructure will require the active cooperation of many agencies, local governments, and landowners. Successful system reoperation will require that the benefits are evident to federal, tribal, regional, and local partners. Systemwide institutional coordination and cooperation need to occur in advance of responding to extreme hydrologic events that may become larger and more frequent with climate change. In Southern California, several flood management dams operated by the U.S. Army Corps of Engineers could potentially be re-operated to enable temporary storage of storm flows and release of the same at rates that would allow water agencies to capture the released water in spreading basins to augment groundwater supplies.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of

each related action. These related actions are also supported by additional recommendations in Chapter 6, "Conveyance — Regional/Local"; Chapter 7 "System Reoperation"; Chapter 8, "Water Transfers"; Chapter 9, "Conjunctive Management and Groundwater Storage"; Chapter 10, "Desalination (Brackish and Sea Water)"; Chapter 12, "Municipal Recycled Water"; Chapter 13, "Surface Storage — CALFED"; Chapter 14, "Surface Storage — Regional/Local"; Chapter 20, "Urban Stormwater Runoff Management"; and Chapter 25, "Recharge Area Protection" of Volume 3, *Resource Management Strategies*.

Related Actions

3.1 The California Department of Water Resource (DWR) and the State Water Resources Control Board (SWRCB) should implement a program to promote public education about groundwater.

3.2 Improve collaboration, coordination, and alignment among State, federal, tribal, local, and regional agencies and organizations to help implement sustainable groundwater management by ensuring that data and tools are evaluated and shared, programs are coordinated, and duplication is minimized.

3.3 DWR, SWRCB, and the Governor's Office of Planning and Research (OPR) should develop a statewide groundwater management planning Web site or portal to promote easy access to groundwater information, such as well completion reports; well drilling, construction, and abandonment standards; groundwater supply and demand; groundwater level and quality; land subsidence; groundwater recharge and conjunctive management; and groundwater management plans and basin studies.

3.4 DWR should build essential data to enable sustainable groundwater management by expanding and funding the California Statewide Groundwater Elevation Monitoring (CASGEM) Program with the purpose of maintaining baseline groundwater level data, funding and providing technical assistance to improve local groundwater management for long-term sustainability, and monitoring impacts of droughts on groundwater resources.

3.5 Under the CASGEM Basin Prioritization, DWR will improve understanding of California's high priority groundwater basins by conducting groundwater basin assessment in conjunction with the California Water Plan five-year production cycle, identifying basins in decline with recognition of both short- and long-term aquifer health, assessing impacts of climate change, identifying management practices for sustainable groundwater management that will prevent waste and unreasonable use of groundwater, and reporting key findings to the Legislature.

3.6 DWR should convene a Statewide Groundwater Management Plan (GWMP) Advisory Committee to develop a GWMP Acceptance Process, evaluate and approve the completeness of existing GWMPs with a special focus on high-priority basins that currently are not actively managed, prepare a guidance document of groundwater best management practices, and develop improved standards for sustainable groundwater management by utilizing a public process.

3.7 State government and integrated regional water management (IRWM) groups should advance groundwater management within the framework of integrated water management by identifying and including the goals and objectives of local GWMPs in integrated regional water management plans; ensuring no transfer of impacts among regions;

ensuring that regions accept responsibility for addressing risks resulting from climate change, population growth, and groundwater depletion; adopting stronger standards for local and regional groundwater management; and considering legislation to provide needed local and regional authority to effectively manage groundwater resources.

3.8 DWR and SWRCB should review analytical tools currently being used and assist local agencies in developing improved tools to assess conjunctive management and groundwater management strategies.

3.9 Groundwater management authorities and collaboratives should increase local and regional groundwater recharge and storage to reduce groundwater depletion and enhance statewide water resource resiliency.

3.10 DWR will complete the System Reoperation Study by 2015 to evaluate reoperation of the state's existing water supply and flood management systems.

3.11 DWR and the U.S. Bureau of Reclamation will:

3.11.1 Complete the North-of-the-Delta Offstream Storage, Shasta Lake Water Resources, and Upper San Joaquin River Basin Storage investigations.

3.11.2 Complete the investigation of the further enlargement of the Los Vaqueros Reservoir.

3.11.3 Complete an investigation to raise B.F. Sisk Dam and enlarge San Luis Reservoir.

Objective 4 — Protect and Restore Surface Water and Groundwater Quality

> *Protect and restore surface water and groundwater quality to safeguard public and environmental health and secure California's water supplies for beneficial uses.*

As California's population continues to grow and climate change impacts continue to occur, greater demands will be made on available water supplies, and threats to water quality from known and emerging pollutants will increase, potentially causing further impairments to the waters and their uses. When water quality is impaired, the state is deprived of critical water supplies needed to support its growing population, vital economy, and the environment. Protecting and restoring water quality ensures that water supplies are available for all beneficial uses and all communities. It is also a crucial element of IWM and essential to maintaining healthy watersheds.

Healthy watersheds, or drainage basins, that provide clean and plentiful surface water and groundwater, and support healthy riparian and wetland habitat, are essential to support California's resources and economic future. A watershed approach is hydrologically focused; recognizes the degree to which groundwater and surface water bodies are connected physically; is aware of the linkages between water quantity and water quality; and requires a comprehensive, long-term approach to water resources management that takes system interactions into account. State government efforts to protect and restore water quality are essential but alone cannot support a comprehensive watershed protection approach. Success depends on the integration of federal, State, tribal, regional, and local programs and projects, including land use decisions made by local officials, stakeholder involvement, and the actions of millions of individuals, which, when taken together, can have significant impacts and make a difference.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action. These related actions are also supported by additional recommendations in Chapter 15, "Drinking Water Treatment and Distribution"; Chapter 16, "Groundwater/Aquifer Remediation"; Chapter 17, "Matching Water Quality to Use"; Chapter 18, "Pollution Prevention"; Chapter 19, "Salt and Salinity Management"; Chapter 20, "Urban Stormwater Runoff Management"; Chapter 25, "Recharge Area Protection"; and Chapter 26, "Sediment Management" of Volume 3, *Resource Management Strategies*.

Related Actions

4.1 Protect and restore surface water quality by implementing strategies to protect the past, present, and probable future beneficial uses for all 2010-listed (Clean Water Act, Section 303[d]) water bodies by 2030.

- 4.1.1 Implement a statewide strategy to efficiently prepare, adopt, and implement total maximum daily loads (TMDLs), which result in water bodies meeting water quality standards, and adopt and begin implementation of TMDLs for all 2010-listed water bodies by 2019.

4.1.2 Manage urban runoff volume to reduce pollutant loadings, reduce wet weather beach postings and closures by 75 percent by 2020, eliminate dry weather beach closures and postings and, where applicable, promote stormwater capture and re-use for development of sustainable local water supplies.

4.1.3 Take appropriate enforcement actions and innovative approaches as needed to protect and restore the beneficial uses of all surface waters.

4.2 Protect and restore groundwater quality by improving and protecting groundwater quality in high-use basins by 2030.

4.2.1 Communities should implement an integrated groundwater protection approach to improve and protect groundwater in high-use basins that:

A. Evaluate and regulate activities that impact or have the potential to impact beneficial uses.

B. Recognize the effects of groundwater and surface water interactions on groundwater quality and quantity.

C. Encourage and facilitate local management of groundwater resources.

4.2.2 State government should identify strategies to ensure that communities with contaminated groundwater have a clean and reliable drinking water supply, which may include remediation of polluted or contaminated groundwater, surface water replacement, and/or groundwater treatment.

4.2.3 State government should implement the recommendations in the State Water Resources Control Board's (SWRCB's) Report to the Legislature on addressing issues associated with nitrate contaminated groundwater.

4.2.4 The SWRCB and regional water quality control boards (RWQCBs) should help groundwater users and management authorities to maintain high-quality groundwater basins through application of antidegradation directives using waste discharge requirements and the remediation of polluted or contaminated groundwater.

4.2.5 Regional and local stakeholders should prepare salt and nutrient management plans for each groundwater basin/subbasin in California by 2016. These salt/nutrient management plans should be prepared as outlined in the SWRCB's Water Quality Control Policy for Recycled Water, adopted May 14, 2009. The RWQCBs should incorporate salt and nutrient management plans into basin plans, where appropriate.

4.3 Evaluate existing water quality protection and restoration, and the relationship between water supply and water quality, and describe the connections between water quality, water quantity, and climate change, throughout California's water planning processes.

4.3.1 As part of the California Water Plan, the SWRCB should evaluate existing water quality problems in the state, prioritize the most pressing problems, and prepare policy recommendations to guide the State's water management activities, including protection and restoration of water quality through the integration of statewide policies and plans, regional water quality control plans (basin plans), and the potential effects of climate change on water quality and supply.

4.3.2 RWQCBs should consistently organize basin plans to provide a clear structure that readily conveys key elements (e.g., beneficial uses, potential impacts

of climate change, water quality objectives, goals for watersheds, plans for achieving those goals, and monitoring to inform and adjust the plans) and that fully integrates other water quality control plans, such as the California Ocean Plan and Water Quality Control Plan for Enclosed Bays and Estuaries.

4.3.3 RWQCBs should adopt basin plan amendments through a collaborative process that involves third parties and incorporates SWRCB requirements and stakeholder interests. An example is the Santa Ana RWQCB's Basin Plan amendment initiated with funding assistance from stakeholders as required in the SWRCB's Recycled Water Policy.

4.3.4 State Government should continue to support efforts of the California Water Quality Monitoring Council to develop a centralized Geographic Information System (GIS) database (EcoAtlas) that displays watershed information, including watershed boundaries, TMDLs, monitoring data, water body types, assigned Beneficial Uses, wetlands, California Rapid Assessment Method scores, vegetation types, and other data. A key component of effective water quality planning is access to pertinent watershed information so that regulatory actions can strategically protect and improve watershed aquatic resources.

4.4 To protect source water and safeguard water quality for all beneficial uses, State government should implement the recommendations from the following California Water Plan Resource Management Strategies found in Volume 3: pollution prevention, matching water quality to use, salt and salinity management, urban stormwater runoff management, groundwater/aquifer remediation, recharge area protection, municipal recycled water, drinking water treatment and distribution, agricultural lands stewardship, ecosystem restoration, forest management, land use planning and management, sediment management, and watershed management.

4.5 The California Department of Public Health (CDPH) will continue to implement its Small Water System Program Plan to assist small water systems (especially those serving disadvantaged communities) that are unable to provide water that meets primary drinking water standards.

4.5.1 CDPH will share the Small Water System Program Plan with relevant federal, tribal, State, regional, and local agencies, as well as stakeholders, to foster additional opportunities for funding, coordinate construction projects in communities, and to assist in local and regional planning efforts.

4.5.2 CDPH will utilize GIS tools to identify large water systems in close proximity to targeted small water systems, and conduct targeted outreach to these large water systems to encourage them to consolidate the small systems into their service area.

4.5.3 CDPH will work with stakeholders to identify obstacles to consolidation (including financial, legal, and local issues) and develop possible actions to address these obstacles.

4.5.4 CDPH will participate in statewide planning efforts to address the water infrastructure needs of small water systems. CDPH should seek input from other states and the federal government on innovative, successful efforts to address the needs of small water systems, and should share its results on implementation of its Small Water System Program Plan.

Objective 5 — Practice Environmental Stewardship

Practice, promote, improve, and expand environmental stewardship to protect biological diversity and sustain natural water and flood management systems in watersheds, on floodplains, and in aquatic habitats.

Development patterns and other natural stressors have contributed to the loss of more than 90 percent of California's wetlands and riparian forests that existed before the Gold Rush. The loss of this rich habitat threatens many native species and biodiversity. Climate change increases the impact of this threat and makes the need for new restoration, expanded conservation areas, and environmental stewardship even more urgent.

An environmental stewardship strategy embraces sustainable, long-term, cost-effective, reduced-risk options that provide multiple public benefits. Expanding environmental stewardship will be critical to maintaining the state's biodiversity. The most robust approach to sustain fish, wildlife, and plant populations is to conserve enough variety and amount of habitat to sustain diverse and healthy (e.g., viable, abundant) populations. Successfully restoring aquatic, riparian, and floodplain species and natural communities typically involves at least partial restoration of physical processes driven by interaction with water.

Projects that preserve, enhance, and restore biological diversity and ecosystem processes are likely to be more sustainable, operating as desired and with less maintenance, and more resistive to exotic species and adaptive to climate impacts. These projects work with, rather than against, natural processes that distribute water and sediment. These processes include the flooding of floodplains, the natural pattern of erosion and deposition of sediment, the balance between infiltrated water and runoff, and large seasonal variation in stream flow. This, in turn, makes such projects less susceptible to the effects of catastrophic events and minimizes the cost and effort of maintenance. Not maintaining physical processes often leads to displacement of native species by exotic species, which presents another huge barrier to ecosystem restoration.

Increasing habitat conservation and/or establishing or restoring habitat connectivity is among the top options to pursue, especially with impacts of climate change. Connectivity of habitat is also essential to allow for the movement and adaptation of species in response to climate change. Identifying areas in project design planning, which will be resilient and able to capture the broadest range of species, is an important challenge but one that can reduce near-term and long-term management conflicts (National Fish, Wildlife & Plants Climate Adaptation Partnership 2012).

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action. These related actions are also supported by additional recommendations in Chapter 21, "Agricultural Land Stewardship"; Chapter 22, "Ecosystem Restoration"; Chapter 23, "Forest Management"; Chapter 26, "Sediment Management"; and Chapter 27, "Watershed Management" of Volume 3, *Resource Management Strategies*.

Related Actions

5.1 Governments and the private sector should work together to create and maintain a network of protected reserve areas across the state that builds on existing conservation investments, and provides refuge areas and migration corridors that allow species to adjust to conditions associated with climate change. The network should include river corridors that connect high elevations to valleys and reestablish natural hydrologic connections between rivers and their historic floodplains (California Natural Resources Agency 2009). The California Natural Resources Agency should support and develop the following:

5.1.1 Establish and maintain a comprehensive, inter-jurisdictional inventory of current conservation areas and candidate high-priority conservation areas to coordinate future conservation efforts.

5.1.2 Work with partners at landscape scales to maximize use of existing conservation programs (e.g., easement, management, mitigation), particularly the conservation titles of the Farm Bill, the private lands programs focused on endangered species, and other federal and State private-lands incentive programs to conserve private lands of high conservation value, to enhance habitat values, and maintain working inland water landscapes under climate change.

5.1.3 Identify species and habitats particularly vulnerable to transition under climate change (e.g., cool-water to warm-water fisheries) and develop management strategies and approaches for adaptation.

5.1.4 Support or create funding sources to develop and utilize models and monitoring data to identify and map high-priority inland water areas/watersheds (i.e., refugia) for conservation by using information on species distributions (current and projected), habitat classification, land cover, and geophysical settings (including areas of rapid change and slow change).

5.1.5 Identify and address conflicting management objectives within and among federal, State, and tribal conservation agencies and private landowners, and seek to align policies and approaches.

5.2 All agencies that own and operate water and flood management systems should include actions in their respective natural resource management plans that restore natural processes of erosion and sedimentation in rivers and streams and increase the quantity, diversity, quality, and connectivity of riverine and floodplain habitats. Local planning activities, including integrated regional water management (IRWM), urban water management plans, watershed management plans, natural community conservation plans, habitat conservation plans, and other water resource or floodplain focused planning efforts, should include objectives to meet these goals.

5.2.1 Re-establish one million acres of contiguous natural riparian, wetland, and floodplain habitat that is subject to periodic flooding for at least 50 percent of the river miles in the regions. This can contribute to Assembly Bill 32 greenhouse gas reduction goals through enhanced carbon sequestration. IRWM and regional flood management plans that incorporate corridor connectivity and restoration of native aquatic and terrestrial habitats to support increased biodiversity and resilience to a changing climate should receive additional credits in State government water and flood grant programs. (See Objectives 1, 2, and 6.)

5.3 State and federal governments should encourage, prioritize, and identify financing for actions to protect, enhance, and restore at least one million acres of upper watershed forests and meadows that act as natural water and snow storage. These actions should include efforts to reduce the risks and impacts of catastrophic wildfire. This measure improves water supply reliability, protects water quality, safeguards high-elevation habitats, and supports carbon sequestration and forest-based economies. (See Objectives 1, 3, and 4.) (Association of California Water Agencies 2013; California Air Resources Board 2008)

5.4 Governments and the private sector should develop and support programs that pay private landowners and managers to protect and improve habitat and nature's water-related services, including flood protection, water quality, groundwater recharge and storage, reversal of land subsidence, prevention of large wildfires, shading of rivers and streams, and reduced soil erosion.

5.5 Governments and the private sector should work to incorporate the economic value of nature's goods and services into natural resource management decisions. Such recognition should include development of ways to measure and report the economic value of those services and the financial return from investment in their protection and enhancement.

5.6 Federal, tribal, State, and local agencies should provide greater resources and coordinate efforts to control invasive species and prevent their introduction (California Department of Fish and Game 2007).

5.7 State and federal government should work with dam owners/operators, tribes, and other stakeholders to evaluate opportunities and technologies to reintroduce anadromous fish to upper watersheds. Re-establishment of anadromous fish upstream of dams may provide additional flexibility in providing cold water downstream in conjunction with water and flood systems reoperation strategies. State and federal governments should develop funding sources to support partnerships in constructing fish passage at dams and to assist removal of obsolete dams that pose a public safety and/or ecological risk.

5.8 State, federal, and local government should identify and prioritize protection of lands of San Francisco Bay and the Delta that will provide the habitat range for tidal wetlands to adapt to and shift with sea level rise. A climate change resilient San Francisco Bay and Delta should include creating greater flood flow capacity by construction of setback levees on islands and removal of strategic island levees that also creates opportunities for tidal wetland and riparian restoration. Such lands and actions can help maintain estuarine ecosystem functions and act as storm buffers, protecting people and property from flood damages. (San Francisco Estuary Partnership 2007)

5.9 State government should prioritize, expand, and support Delta islands and Suisun Marsh subsidence reversal and land accretion projects to help reestablish equilibrium between land and estuary elevations. Sediment-soil accretion is a cost-effective, natural process that can help sustain the Delta and Suisun Marsh ecosystem, and reduce communities' risks from flooding, as well as sequester carbon and restore estuarine ecosystem functions.

5.10 State and federal government should fund natural resource protection agencies to continue work to determine fishery needs and provide funds for water right holders to meet those needs.

Objective 6 — Improve Flood Management Using an Integrated Water Management Approach

> *Promote and practice flood management that reduces flood risk to people and property and maintains and enhances natural floodplain functions using an IWM approach. An IWM approach utilizes a systemwide perspective and considers all aspects of water management, including public safety and emergency management, environmental sustainability, and economic stability (which includes water supply reliability, water quality, and system and community resiliency).*

Flood management has traditionally had the single purpose of protecting people and property that could be harmed by flood waters by separating them from the flood. In contrast, flood management using an IWM approach seeks to protect people and property exposed to flooding, while also addressing the quality and functioning of ecosystems, the reliability of water supply and water quality, and economic stability (including both economic and cultural considerations). This shift changes the focus of flood management from managing flood water to managing floodplains, thus allowing for both a local/regional and a systemwide context.

Today, one in five Californians live in a floodplain. There are more than 20,000 miles of levees, over 1,500 dams, more than 1,000 debris basins, and other facilities statewide that manage flood water and provide flood risk reduction. Traditionally, Californians have reduced the risk of flooding through actions like building dams, levees, and other facilities that constrain floodwaters and provide protection to people from the harmful aspects of flooding, but these facilities also diminish the natural benefits of floods. These facilities face a number of challenges, including reaching the end of their useful life, inadequate operations and maintenance, insufficient capacities, and stressors resulting from climate change. Climate change may cause sea levels to rise, produce higher tides, shift precipitation patterns toward more intense winter storms, and produce higher peak flows, thereby increasing the state's flood risk.

A collection of laws passed in 2007 and 2008 focused attention on flooding and the risks it poses. These laws intended to promote a new perspective for managing floods. Despite the amount of progress and improvements that have been made since the passage of these laws, Californians still face an unacceptable level of flood risk. Current infrastructure strains to meet existing objectives, and changing climatic conditions could exacerbate this situation. With climate change and other changing conditions, improving system flexibility and adaptability must be a foundational strategy, especially with respect to water and flood system operations and management.

Flood management is evolving from the more narrowly focused traditional approaches toward an IWM approach. This more integrated approach includes a mix of structural and non-structural approaches to reduce flood risk and enhance the ability of undeveloped floodplains and other open spaces to behave more naturally to absorb, store, and slowly release floodwaters during small and medium-size events. Flood management using an IWM approach considers land and water resources on a watershed scale to maximize the benefits of floodplains; minimize loss of life and damage to property from flooding; recognize the benefits to ecosystems from periodic flooding; and provide other potential benefits, such as water supply reliability, water quality improvements, and increased recreation opportunities. Flood management using an IWM approach extends the range of resource management strategies that could be employed and leads to addressing a wide variety of needs. Using an IWM approach encourages an increased

understanding of the cause and effect of different management actions. Additionally, the IWM approach is tailored to the physical attributes of a hydrologic region or watershed; the presence of undeveloped floodplains; the type of flood hazards (e.g., riverine, alluvial fan, coastal); and the areal extent of flooding.

An IWM approach requires unprecedented institutional alignment and cooperation among public agencies, tribal entities, land owners, interest-based groups, and other stakeholders. This approach relies on blending knowledge from a variety of disciplines, including engineering, planning, economics, environmental science, public policy, and public information. It is not a one-time activity but rather an ongoing process. The following actions provide policy recommendations for improving flood management by using an IWM approach, which are supported by additional recommendations in Chapter 4, "Flood Management," in Volume 3, *Resource Management Strategies*.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

6.1 Agencies at all levels should utilize integrated water management (IWM) principles that consider flood risk, mitigation, and protection of natural floodplain functions for planning and implementing flood management projects. Collaborate with planners, engineers, scientists, regulators, and other stakeholders to identify flood risk reduction and floodplain restoration strategies that can be used in local and regional planning efforts, such as integrated regional water management plans, general plans, regional economic and transportation plans, resource conservation plans, floodplain management plans, and others. This should include best management practices (BMPs) for coastal zones, alluvial fans, headwaters, and riverine floodplains in urbanized and non-urbanized areas.

6.2 State government should periodically update the 2013 *California's Flood Future Report: Recommendations for Managing the State's Flood Risk* (California's Flood Future), which further advances the recommendations developed as part of the original California's Flood Future effort.

6.3 Local agencies should work together in regions to develop regional flood risk assessments to evaluate potential adverse impacts of flooding on life, property, infrastructure, the environment, and the economy. The risk assessments should be developed through regional collaboration among local, state, and federal stakeholders, and based on a consistent methodology, appropriate to the region, for flood risk assessment. This assessment should include a determined acceptable level of flood risk for people, property, and the environment within the region. The flood risk assessments should include a set of digital maps for planning and communication of flood risk to agencies, the public, elected officials, and other stakeholders.

6.4 State government should develop comprehensive economic evaluation guidance for flood risk assessment and other flood management activities. The economic evaluation guidance should include methods to evaluate ecosystem services and other IWM benefits and should be adaptable to different areas of the state.

6.5 Local agencies should work together regionally to develop regional flood risk management plans based on regional risk assessments and define short-term and long-term goals, objectives, actions, and associated implementation strategies for reducing flood risk, as well as define opportunities to enhance natural floodplain functions and provide other IWM benefits. These plans should reflect a collaborative, stakeholder-based process addressing the unique regional and statewide interests, critical needs, and priorities. These plans should address, as appropriate: the locally identified level of flood protection; flood risk and flood damage reduction and mitigation strategies, including natural floodplain function; operations and maintenance; and local, regional and state IWM strategies.

6.6 State government should work with federal and local agencies to develop a statewide flood management investment approach. This approach would evaluate short- and long-term financing needs, as well as available investment strategies, and should lay out potential future investment alternatives for flood management statewide. This action will also be informed by the outcomes of Objective 17.

6.7 State government should take appropriate action to facilitate revenue generation and support regional flood risk management. This includes an evaluation of existing financing mechanisms and legal frameworks to facilitate the development of regional flood-risk reduction financing.

6.8 State government should collaborate with planners, engineers, scientists, regulators, and other stakeholders to develop BMPs for land use planning that achieve flood risk reduction and protection of natural floodplain functions. BMPs should be developed for local planning (e.g., general plans, land use regulations) that is conducted by cities and counties and for regional planning (e.g., sustainable communities strategies and blueprint plans) that is conducted by regional planning agencies. Land use planning BMPs should be developed for coastal zones, alluvial fans, headwaters, and riverine floodplains in urbanized and non-urbanized areas.

6.9 State government should work with federal and local agencies to develop a comprehensive regional vulnerability analysis approach and set of regional adaptation strategies for climate change impacts on flood risk and floodplain ecosystems.

6.10 State government should create and coordinate statewide and regional environmental regulatory working groups to improve and streamline regulatory review processes that will address critical flood-risk reduction projects, flood system maintenance, flood emergency response, and floodplain restoration (see Objective 16). State and federal environmental regulatory agencies, in collaboration with regional stakeholders, should take actions to streamline regulatory review while recognizing the unique differences among geographical regions of the state.

6.11 State government should develop a comprehensive set of materials and tools to assist public agencies in obtaining accurate information on flood risk and floodplain conditions and increase public awareness of flood risks and potential IWM solutions in that region. State government should develop regional and statewide indicators of flood risk and floodplain conditions and create online regional and statewide flood risk and floodplain information resources for government agencies and for the public. These resources should include regional maps with information on flood risk and floodplain conditions and indicators; outreach and communication tools, including tailored outreach materials as needed to meet the unique needs of each region; and materials that clarify the roles

and responsibilities of local, state, tribal, and federal agencies in flood risk reduction and floodplain restoration efforts, including emergency response.

6.12 State government should increase support for flood emergency preparedness, response, and recovery programs to reduce flood risk by identifying data and forecasting needs; conducting statewide flood emergency management (EM) exercises; working with locals to improve flood EM plans; and supporting increased coordination between flood EM responders, planners, facility managers, and resource agencies (see Objective 8).

6.13 In June 2012, the Central Valley Flood Protection Board adopted the first Central Valley Flood Protection Plan (CVFPP). Prepared by the California Department of Water Resources, the plan presents a long-term vision for improving integrated flood management in the Central Valley and achieving a more flexible, resilient, and sustainable flood management system over time. In implementing this vision, State government should take the following actions consistent with the goals of the CVFPP:

- 6.13.1 Update the CVFPP in years ending in 2 and 7.
- 6.13.2 Continue to work with local and regional entities and the federal government to plan and refine physical improvements to the State Plan of Flood Control.
- 6.13.3 Periodically update the Flood Control System Status Report, which provides information on the current status and conditions of State Plan of Flood Control facilities.
- 6.13.4 Continue to develop criteria and guidance to assist local cities and counties in demonstrating an urban level of flood protection consistent with State law.
- 6.13.5 Continue to develop policies, guidance, and funding mechanisms to implement flood management projects by using an IWM approach in the Central Valley.
- 6.13.6 Continue to develop guidance and take actions to support wise management of floodplains and residual flood risks present in floodplains protected by the State Plan of Flood Control.

6.14 In May 2013, the Delta Stewardship Council adopted the Delta Plan. The Delta Plan was developed to guide State and local agencies to help achieve the coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. To support the implementation of the Delta Plan, the following flood-related actions should be taken:

- 6.14.1 The Legislature should establish a Delta Flood Risk Management Assessment District with fee authority (including over State infrastructure).
- 6.14.2 The Legislature should fund State agencies to evaluate and implement a bypass and floodway on the San Joaquin River near Paradise Cut.
- 6.14.3 The Legislature should require adequate levels of flood insurance for residences, businesses, and industries in flood-prone areas.
- 6.14.4 The Legislature should consider statutory and/or constitutional changes that would address the State's potential flood liability.

6.14.5 State government should evaluate whether additional areas both within and upstream of the Delta should be designated as floodways and should include the consideration of the anticipated effects of climate change in these areas.

6.14.6 State government should develop criteria to define locations for future setback levees in the Delta and Delta watershed.

6.14.7 State and local agencies and regulated utilities that own and/or operate infrastructure in the Delta should prepare coordinated emergency response plans to protect the infrastructure from long-term outages resulting from failures of the Delta levees. The emergency procedures should consider methods that also would protect Delta land use and ecosystem.

6.14.8 The U.S. Army Corps of Engineers (USACE) should consider a variance that exempts Delta levees from the USACE's levee vegetation policy.

Objective 7 — Manage the Delta to Achieve the Coequal Goals for California

> *Manage the Delta as both a critically important hub of the California water system and as California's most valuable estuary and wetland ecosystem. Achieve the two coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.*

After years of slow decline, the condition of the Delta's watery ecosystem, as measured especially by the population of wild salmon and other native fishes, has gone critical. Today, all those who depend on or value the Delta are, in a word, afraid. Delta residents face the possibility of floods from the east when the rivers flow strongly and of salinity intrusion from the west if they flow feebly. Fishermen, both commercial and recreational, fret about the future of salmon and other species. Water suppliers that receive water from the Delta find those supplies insecure and subject to interruption by weather vagaries, levee failures, or pumping restrictions imposed in the desperate attempt to stem the decline of fish.

In 2009, the Legislature made its latest, most determined bid to find solutions, passing the Delta Reform Act and associated bills. First and foremost, it declared that State policy toward the Delta must henceforth serve two "coequal goals" (see Box 8-3):

- Providing a more reliable water supply for California.
- Protecting, restoring, and enhancing the Delta ecosystem.

These goals, the Legislature added, must be met in a manner that:

- Protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

By affirming the equal status of ecosystem health and water supply reliability, the Legislature changed the terms of the conversation. It changed them further with the following pronouncement: "The policy of the State of California is to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in regional supplies, conservation, and water use efficiency." Here was recognition that, for the sake of the water system and the Delta both, a partial weaning of the one from the other will be required.

With the package of 2009 water bills, the Legislature also established the Delta Stewardship Council with a mandate to resolve long-standing issues and to develop a Delta Plan. The Delta Plan is California's plan for the Delta, prepared in consultation with, and to be carried out by, all agencies in the field: the SWRCB, which allocates water rights and protects water quality; DWR, which is the State's water planner and operator of the State Water Project; the California Department of Fish and Wildlife (DFW), which is responsible for the welfare of the living system of the Delta; the Delta Protection Commission, which oversees land use and development on low-lying Delta islands; and many more agencies, State and local.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related

Box 8-3 Delta Policy on the Coequal Goals

The policy of the State of California is to achieve the following objectives that the Legislature declares are inherent in the coequal goals for management of the Delta:

1. Manage the Delta's water and environmental resources and the water resources of the state over the long term.
2. Protect and enhance the unique cultural, recreational, and agricultural values of the California Delta as an evolving place.
3. Restore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem.
4. Promote statewide water conservation, water use efficiency, and sustainable water use.
5. Improve water quality to protect human health and the environment consistent with achieving water quality objectives in the Delta.
6. Improve the water conveyance system and expand statewide water storage.
7. Reduce risks to people, property, and State interests in the Delta by effective emergency preparedness, appropriate land uses, and investments in flood protection.
8. Establish a new governance structure with the authority, responsibility, accountability, scientific support, and adequate and secure funding to achieve these objectives.

Source: Water Code Section 85020

Actions and Performance Measures," and will be used to track the future progress of each related action. These related actions are also supported by additional recommendations in Chapter 5, "Conveyance — Delta," and Chapter 21, "Agricultural Land Stewardship," of Volume 3, *Resource Management Strategies*.

Related Actions

7.1 State or local public agencies undertaking covered actions must file certifications of consistency with the Delta Stewardship Council. Certifications of Consistency must include detailed findings that demonstrate how the covered action is consistent with all the policies of the Delta Plan.

7.2 Provide a more reliable water supply for California by implementing the following:

7.2.1 All water suppliers should fully implement applicable water efficiency and water management laws, including urban water management plans; the 20 percent reduction in statewide urban per capita water usage by 2020; agricultural water management plans; and other applicable water laws, regulations, or rules.

7.2.2 The California Department of Water Resource (DWR), in consultation with the Delta Stewardship Council, the State Water Resources Control Board (SWRCB), and others, should develop and approve guidelines for the preparation of a water supply reliability element as part of the update of an urban water management plan, agricultural water management plan, integrated water management plan, or other plan that provides equivalent information about the supplier's planned investments in water conservation and water supply development. The expanded water supply reliability element should include the details recommended in the

Delta Plan. Water suppliers that receive water from the Delta watershed should include an expanded water supply reliability element in their water management plans, starting in 2015.

7.2.3 DWR and the SWRCB should establish an advisory group with other state agencies and stakeholders to identify and implement measures to reduce impediments to achievement of statewide water conservation, recycled water, and stormwater goals. This group should evaluate and recommend updated goals for additional water efficiency and water resource development.

7.2.4 DWR, the SWRCB, the California Department of Public Health (CDPH), and other agencies, in consultation with the Delta Stewardship Council, should revise State grant and loan ranking criteria to be consistent with Water Code section 85021 and to provide a priority for water suppliers that includes an expanded water supply reliability element in their adopted urban water management plans, agricultural water management plans, and/or integrated regional water management (IRWM) plans.

7.2.5 DWR and the U. S. Bureau of Reclamation (USBR) will complete the Bay Delta Conservation Plan (BDCP) (both the Habitat Conservation Plan/Natural Communities Conservation Plan and the Environmental Impact Report/ Environmental Impact Statement), a 50-year ecosystem-based plan designed to restore fish and wildlife species in the Delta in a way that protects California's water supplies while minimizing impacts on Delta communities and farms. Upon adoption of the BDCP and receiving the necessary permits by the regulating agencies, DWR and the USBR will implement the 22 proposed conservation measures in the BDCP to help wildlife and reverse the decline of native fish populations in the Delta.

7.2.6 DWR, in coordination with the SWRCB, CDPH, California Public Utilities Commission (CPUC), California Energy Commission (CEC), USBR, California Urban Water Conservation Council, and other stakeholders, should develop a coordinated statewide system for water use reporting. Water suppliers that export water from, transfer water through, or use water in the Delta watershed should be full participants in the database.

7.2.7 DWR, in consultation with the SWRCB and other agencies and stakeholders, should evaluate and include in the next and all future California Water Plan updates information needed to track water supply reliability performance measures identified in the Delta Plan, including an assessment of water efficiency and new water supply development, regional water balances, improvements in regional self-reliance, reduced regional reliance on the Delta, and reliability of Delta exports, and an overall assessment of progress in achieving the coequal goals.

7.2.8 Immediately provide financial incentives and technical assistance through the IRWM plans and the Local Groundwater Assistance Program to improve surface water and groundwater monitoring and data management.

7.3 Water quality in the Delta should be maintained at a level that supports, enhances, and protects beneficial uses identified in the applicable SWRCB or regional water quality control board (RWQCB) water quality control plans.

7.3.1 The SWRCB should update the Bay-Delta Water Quality Control Plan objectives as follows:

A. By June 2, 2014, adopt and begin to implement updated flow objectives for the Delta, which are necessary to achieve the coequal goals.

B. By June 2, 2018, adopt, and as soon as reasonably possible, implement flow objectives for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals.

7.3.2 The SWRCB and RWQCBs should work collaboratively with DWR, California Department of Fish and Wildlife (DFW), and other agencies and entities that monitor water quality in the Delta to develop and implement a Delta Regional Monitoring Program that will be responsible for coordinating monitoring efforts so Delta conditions can be efficiently assessed and reported on a regular basis.

7.3.3 DFW and other appropriate agencies should prioritize and implement actions for non-native invasive species from the *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (California Department of Fish and Game 2011).

Objective 8 — Prepare Prevention, Response, and Recovery Plans

Prepare prevention, response, and recovery plans for floods, droughts, and catastrophic events to help residents and communities, particularly disadvantaged communities, make decisions that reduce the consequences and recovery time of these events when they occur.

An overall purpose of this objective is to prepare prevention response and recovery plans that coordinate the actions by State agencies, local governments, business and industry, and citizens.

The State Multi-Hazard Mitigation Plan (SHMP) is the official statement of California's statewide hazard mitigation goals, strategies, and priorities. Hazard mitigation can be defined as any action taken to reduce or eliminate long-term risk to life and property by natural and human-caused disasters. The SHMP classifies hazards into a hierarchy of primary impacts (earthquake, flood, wildfire); secondary impacts (vulnerable levees, landslides, tsunamis); climate-related hazards (drought, heat, severe storms); and other (terrorism, hazardous materials release, dam failure).

The hazards of floods and droughts have an obvious nexus to water planning. Other hazards, such as earthquakes and wildfire, have a less obvious nexus, but they can have impacts on and from water. As California grows, it faces the dual challenges of addressing vulnerabilities in the built and natural environment while accommodating growth and change in ways that avoid or mitigate future vulnerabilities.

Of these hazards, drought differs in the timing of the impacts. The impacts of drought are typically felt first by those most reliant on annual rainfall — ranchers engaged in dry land grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable source. Drought impacts increase with the length of a drought, as carryover supplies in reservoirs are depleted and water levels in groundwater basins decline. However, unlike earthquakes, fires, or floods, drought onset is slow, allowing time for water suppliers to implement preparedness and response actions to mitigate reductions in normal supplies.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in the Volume 4, *Reference Guide*, entitled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

8.1 Communities in floodplains should consider the consequences of flooding and should develop, adopt, practice, and regularly evaluate formal flood emergency preparedness, response, evacuation, and recovery plans (see Objective 6).

- 8.1.1 State government should assist disadvantaged communities located in floodplains to prepare for and recover from flood emergencies.

8.2 The California Department of Water Resource (DWR) should review scientific literature and climate change models to evaluate if water suppliers should plan for more than three consecutive dry years as currently required for the water shortage contingency section of

urban water management plans. DWR, working through a public process, could include any recommended changes in its Report to the Legislature on the Status of the 2015 urban water management plans.

8.3 Following the official end of the current drought and as part of the "after action" drought evaluation, DWR will update the California Drought Contingency Plan, which includes:

A. Articulation of a coordinated strategy for preparing for, responding to, and recovery from drought.

B. Assessment of state drought contingency planning and preparedness.

C. Description of State government's role and responsibilities for drought preparedness.

D. Identification of needed improvements for drought monitoring and preparedness.

E. Identification of measures to mitigate the economic, environmental, and social risks and consequences of drought events.

F. Assessment of and adaptation to the impacts of drought under existing and future conditions, including climate change.

G. Identification of needed improvements to real-time surface water and groundwater monitoring programs.

H. Identification of needed research in drought forecasting.

I. Identification of needed research of the indices and metrics for assessing the levels of drought.

8.4 DWR will work with the California Governor's Office of Emergency Services (Cal OES) to develop preparedness plans to respond to other catastrophic events, such as earthquakes, wildfires, chemical spills, facility malfunctions, and intentional disruption, which would disrupt water resources and infrastructure.

8.5 Cal OES, the California Governor's Office of Planning and Research, and the California Natural Resources Agency should lead an effort to update the State Emergency Plan and State Multi-Hazard Mitigation Plan to strengthen consideration of climate impacts to hazard assessment planning, implementation priorities, and emergency responses.

8.6 Cal OES, DWR, and the Delta counties should work together to develop a catastrophic flood response plan for the Delta region. This plan should support an integrated response within the Delta and increase communication efforts between stakeholders and federal, State, tribal, local, and private agencies.

8.7 Cal OES will work with appropriate agencies to update the San Francisco Bay Area Catastrophic Earthquake Response Plan and incorporate lessons learned from the 2013 Golden Guardian exercise.

Objective 9 — Reduce the Carbon Footprint of Water Systems and Water Uses

Maximize the efficient use of California's surface and groundwater supplies through integrated policies and strategies that reduce the carbon footprint of water while meeting the needs of a growing population, improving public safety, fostering environmental stewardship, and supporting a stable state economy.

In December 2008, the California Air Resources Board (ARB) approved the AB 32 Scoping Plan, which included six measures for reducing the energy intensity and resulting GHG emissions of water uses and water and wastewater management systems. These six measures were included as related actions in Update 2009.

In early 2013, ARB initiated activities to update the AB 32 Scoping Plan to evaluate the mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. The AB 32 Scoping Plan update will define ARB's climate change priorities for the next five years and lay the groundwork to reach post-2020 goals set forth in Executive Orders S-3-05 and B-16-2012. The AB 32 Scoping Plan update will highlight California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the original Scoping Plan (2008). It will also evaluate how to align the State's longer-term GHG reduction strategies with other State policy priorities, such as for water, waste, natural resources, clean energy and transportation, and land use.

In October 2013, ARB released a "Discussion Draft" of the AB 32 Scoping Plan Update. ARB expects to release a public review draft in late January 2014, with board adoption of the final Scoping Plan Update in spring 2014. Additional information is available on the ARB's Web site at: http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

9.1 State government should provide cap-and-trade funding to make water and wastewater conveyance, treatment, and distribution/collection systems more energy efficient.

9.2 The California Department of Water Resources (DWR), the State Water Resources Control Board (SWRCB), and other State agencies should continue to leverage State funding sources with local funding for implementation of regional water management plans, including water and energy efficiency projects and climate change mitigation and adaptation activities.

9.3 DWR, SWRCB, and other State agencies should provide incentives to increase water conservation and energy efficiency in agricultural and food processing sectors, industrial processes, and residential and commercial buildings and landscaping.

9.4 DWR, SWRCB, the California Energy Commission, and other State agencies should update and implement new water-related energy conservation measures and energy efficiency standards for water use.

9.5 The SWRCB and other State agencies should support resource-recovering wastewater treatment projects.

9.6 DWR, SWRCB, and other State agencies should work with non-governmental carbon registries to develop standardized methodologies and protocols to enable the collection of accurate and comparable data on embedded energy and carbon in water systems.

9.7 State government should evaluate the appropriate relationship between ratepayer and public financing of greenhouse gas (GHG) emissions reduction projects in the water and wastewater sectors.

9.8 State government should support local agency models for pricing and rate structures that promote water use efficiency while ensuring stabilization of local agency finances and affordability for low-income households.

9.9 DWR, SWRCB, and other State agencies should support local groundwater management that contributes to enhanced water quality and water supply reliability while reducing the energy intensity of groundwater pumping.

9.10 The SWRCB and the regional water quality control boards should modify their policies, permits, and monitoring guidelines to reflect regional climate change scenarios and other best-available climate science.

9.11 State government should facilitate partnerships between local water, wastewater, and energy utilities to further implement joint water-energy programs, including model programs of efficient landscape and agricultural irrigation.

9.12 State government should increase its role in developing policies, providing financial incentives, and employing regulatory alignment to reduce the carbon footprint of water systems and water uses.

9.13 State government should conduct an independent peer review of the existing, water-related AB 32 Scoping Plan measures, to determine the real GHG emissions reductions achieved to date and assess the technical feasibility and cost-effectiveness of those measures.

9.14 State government should promote water-energy conservation outreach and education.

Objective 10 — Improve Data, Analysis, and Decision-Support Tools

Improve and expand data management, analysis, and decision-support tools to advance IWM, given demographic, land use, climate, environmental, and institutional uncertainties.

The actions described here are intended to promote significant improvements in how water managers monitor, develop, and share water information to support IWM of California's water resources by making data more standardized and accessible, supporting critical updates of analytical tools, and fostering technical collaboration to support policy decisions. Investment in our analytical capabilities lags far behind the growing challenges facing water managers. Significant new investment in technical capabilities is needed to prepare for the impacts from extended droughts, floods, and climate change, as well as to improve management of the Delta and other complex water operations.

Sound technical information is critical to making policy decisions. Improving communication, cooperation, and collaboration among technical experts and government agency decision-makers goes hand in hand with improving our technical capabilities related to data collection, management, and exchange and analytical tool development and applications. To accomplish this, it is essential to organize and resource an institutional framework to facilitate and sustain a collaborative and coherent technical program among State and federal agencies and academia. Such an effort would take advantage of related activities under the recently developed Delta Science Plan and ongoing activities of the California Water and Environment Modeling Forum.

This objective and its related actions rely heavily on information contained in Chapter 6, "Integrated Data and Analysis." The related actions were informed by advice from the Statewide Water Analysis Network (SWAN), which serves as the technical advisory group for the CWP. SWAN consists of technical experts from federal, State, and local agencies; universities; non-governmental organizations; consultants; and tribes. Additional sources of information include the Update 2013 featured companion State plans described in Chapter 4, "Strengthening Government Alignment," particularly the Delta Plan from the Delta Stewardship Council and the recommendations from the Alluvial Fan Task Force. The actions were also informed by the CWP's State Agency Steering Committee, Public Advisory Committee, and Tribal Advisory Committee, as well as stakeholder input at workshops to discuss the Update 2013 objectives and related actions.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

10.1 The California Department of Water Resources (DWR) should form an integrated water management (IWM) technical committee to improve communication, cooperation, and collaboration among and between technical experts and government agency decision-makers related to data collection, management, and exchange and analytical tool development and applications. The committee should be comprised of DWR, State Water

Resources Control Board, California Department of Public Health, California Public Utilities Commission, Delta Stewardship Council, California Energy Commission, U.S. Bureau of Reclamation, U.S. Army Corps of Engineer's Hydrologic Engineering Center, California Council for Science and Technology, University of California, California State University, and other interested State and federal agencies, and should work in partnership with the California Water and Environmental Modeling Forum, California Urban Water Conservation Council, regional water management groups (IRWMs), and interested California Native American Tribes, local agencies, non-governmental organizations, and stakeholders.

Improve Water Data and Information

To improve water data and information, DWR should take the following actions, in coordination with the IWM technical committee described under Related Action 10.1:

10.2 Establish standards and protocols for data collection and management that facilitate sharing of information among agencies and modeling studies. This would include identifying and cataloging existing water data for California; creating a water data dictionary; and developing standards and metadata for water data monitoring, collection, and reporting.

10.3 Develop a strategic plan for data management that prioritizes long-term improvements in the monitoring network, supports risk-based decision-making, and identifies adequate resources for long-term maintenance of, and access to, water management information.

10.4 Improve drought planning and preparation by:

- 10.4.1 Developing drought metrics (indicators) with the goal of providing early detection and determination of drought severity.
- 10.4.2 Developing and improving monitoring of key indicators of regional water vulnerabilities.
- 10.4.3 Improving the system of stream gauging for the purpose of managing water resources in low-flow conditions and improving the accuracy of seasonal runoff and water supply forecasts.
- 10.4.4 Improving groundwater monitoring and assessment by providing technical and financial support to develop real-time monitoring of groundwater data.
- 10.4.5 Expanding the existing surface water and groundwater monitoring networks, where needed.

10.5 Develop a strategy and implementation plan for measuring, compiling, and reporting water use and water quality data. The accurate measurement of water use and water quality, as well as the timely publication and broad distribution of the resulting data, will facilitate better water planning and management, especially in the context of managing aquifers more sustainably. These enhancements will also facilitate the development of more accurate water budgets.

10.6 Sponsor science-based, watershed adaptation research and pilot projects to address water management and ecosystem needs, improve aquatic species and habitat monitoring, and

develop an accessible and standardized database for reporting watershed and headwater conditions.

Improve Data and Information Exchange

To improve data and information exchange, DWR should take the following actions, in coordination with the IWM technical committee described under Related Action 10.1:

10.7 Develop the Water Planning Information Exchange (Water PIE) to facilitate sharing data and networking existing databases among federal, State, tribal, regional, and local agencies and governments; nonprofit organizations; and citizen monitoring efforts. The Water PIE data framework will help improve analytical capabilities and develop timely surveys of statewide land use, water use, and estimates of future implementation of resource management strategies. Potential beneficiaries of the Water PIE will include urban water management plans, agricultural water management plans, groundwater management plans, integrated regional water management plans, and the California Water Plan.

10.8 Support establishment of an open, organized, and documented quantitative representation of the State's intertied water system to serve as a common and standardized data platform for model development and analysis by federal, State, tribal, regional, and local water planners.

10.9 Implement Shared Vision Planning or similar collaborative modeling approaches to integrate tried-and-true planning principles, systems modeling, and collaboration into a practical forum for making more informed and durable water resources management decisions.

Improve Analytical Tools

To develop and use analytical tools more effectively, DWR should take the following actions, in coordination with the IWM technical committee described under Related Action 10.1:

10.10 Expand the Central Valley Planning Area-based analytical tool and scenario studies developed during the California Water Plan Update 2013 to assess future vulnerabilities and management responses in the other hydrologic regions for California Water Plan Update 2018. The regional analytical tools and analyses should include evaluation of water supply reliability, water efficiency and new water supply development, regional water balances, improvements in regional self-reliance, reduced regional reliance on the Delta, and reliability of Delta exports. Over time, these tools should be enhanced to include metrics for water quality, economics, flood exposure, public safety, energy, and environmental factors by which to evaluate a greater number of the resource management strategies identified in Volume 3 of California Water Plan Update 2013.

10.11 Develop a shared conceptual understanding, analytical framework, and quantitative description of how California watersheds and water management systems are represented in analytical tools at different spatial and temporal scales for use by federal, State, tribal, regional, and local agencies and organizations.

10.12 Support the California Water and Environmental Modeling Forum in updating its 2000 modeling protocols and standards to provide more current guidance to water stakeholders and decision-makers, as well as their technical staff, as models are developed and used to solve California's water and environmental problems.

Objective 11 — Invest in Water Technology and Science

> *Identify, develop, and prioritize research needs for new technologies; advance development and implementation of existing and emerging tools, technologies and innovations; and encourage partnerships in water-related technology and science to promote more efficient, effective, and sustainable water resources management and a better scientific understanding of California's water-related systems.*

The related actions for this objective were significantly informed by the CWP Water Technology Caucus and the California Council for Science and Technology (CCST). The CWP Water Technology Caucus is a statewide, topic-based workgroup designed to support development of Update 2013 through in-depth discussions and deliberations of innovation, applied research and development, and technology. The Water Technology Caucus helped identify and expand information associated with statewide and regional opportunities and challenges for implementing new water technologies in California. The statewide and regional information helps inform technology planning efforts, pilot projects, and investments by federal, State, tribal, regional, and local governments; non-governmental organizations; and private applied research and innovation initiatives. This collaborative process can lead to the commercialization of new water technologies; an enhanced focus on California water research, information, and data needs (see also Objective 10 — Improve Data, Analysis, and Decision-Support Tools); and a better scientific understanding of California's water-related systems.

The Water Technology Caucus worked closely with California research and academic institutions working on water technology initiatives to develop the water technology-related actions for Update 2013. Innovations in science and technology have long been recognized as a key driving force of economic growth, especially in high-technology economies such as California's. However, State government has limited resources and is seeking ways to most effectively encourage and sustain an environment where innovation can flourish.

In early 2012, the CCST initiated the California's Water Future Project to identify and describe technology innovation and/or systems approaches currently under development or available for application. These innovations can be used in California, on a statewide, regional, local, or project basis, for immediate adoption and within the next five to 10 years to enhance California's IWM; efficient water use; effective groundwater management; and environmental restoration and sustainable management, including optimization of river systems for state-determined goals. The project goals were to make specific recommendations regarding:

- Technologies that appear to have the most promise for California over the next 5-10 years.
- Policy and process changes needed to commercialize and more broadly deploy identified innovation.
- Understand potential impacts and consequences of technology implementation.

The target audience for the California's Water Future Project is anyone in the science and technology community with an interest in water; DWR; and federal, State, and local policy-makers. Additional information on CCST's Water Future Project is available in Volume 4, *Reference Guide*.

State government will continue to work with California research and academic institutions — such as the California Academy of Sciences, California Council on Science and Technology, the University of California, California State University, and other universities and colleges — to identify and prioritize applied research projects leading to the commercialization of new water technologies and better scientific understanding of California's water-related systems.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

11.1 Federal, State, tribal, regional, and local governments; non-governmental organizations, California research and academic institutions, and private applied research and innovation initiatives should work together to identify, prioritize, and fund applied research projects with a goal to commercialize new water technologies and advance cost and energy-efficient emerging tools and technologies. The California Council for Science and Technology (CCST) should play a leadership role to facilitate collaboration among the above-mentioned organizations and entities to encourage fuller implementation of existing, effective water technologies — in support of more integrated, aligned, and sustainable water management.

11.2 Advance new water technology to improve Data Management and Modeling by implementing the following actions:

- 11.2.1 Develop and implement a standardized protocol and implementation plan for water use and water quality monitoring and reporting necessary for sustainable California water planning and management.
- 11.2.2 Develop a standardized protocol and guidelines for distributed data storage and retrieval for database managers with all data linked to the appropriate metadata.
- 11.2.3 Development of effective interactive data portals, such as the California Department of Water Resources' (DWR's) Water Planning Information Exchange (Water PIE) and UC Davis's Hobbes, should continue with a high priority.
- 11.2.4 Support the maintenance of current modeling protocols and standards that provide guidance to water stakeholders and decision-makers, as well as their technical staff, as models are developed and applied to solve California's water and environmental problems. The California Water and Environmental Modeling Forum should continue to have a major role in this important effort.

11.3 Advance new water technology to improve both in situ (on-site) and remote sensing for data acquisition by implementing the following actions:

- 11.3.1 Coordinate in situ sensing and remote sensing systems more closely and expand existing monitoring networks (both in situ and remote) using mature wireless-sensor technology to improve the spatial and temporal resolution of measurements of hydrometeorological variables.

11.3.2 Develop practicable mechanisms for closer coordination between the scientific and technical experts that develop, operate, maintain, and use in situ sensor networks and remote sensing instruments, when this coordination can appreciably enhance the value of both data collection efforts.

11.3.3 Adapt satellite sensor output to operational use, where it is demonstrated that the satellite readings represent mature technologies and are being produced on an ongoing basis, making them reliable sources of information for water-resources decision-making over the long term. Examples of this include snow-covered areas and albedo products (http://www.nohrsc.noaa.gov/nh_snowcover/), the UC Irvine real-time, high-resolution Satellite precipitation (http://hydis.eng.uci.edu/gwadi/), and global drought information (http://drought.eng.uci.edu/).

11.3.4 Increase use of airborne sensor platforms as a compliment to satellite platforms for sustaining data acquisition, providing a gap-fill between satellite missions, and as a cost-effective strategy for collecting data that is of high value but for limited regions at limited times (e.g., snow water resources).

11.3.5 Provide opportunities and incentives for meaningful partnerships between the National Aeronautics and Space Administration, universities, State and local agencies, and non-governmental organizations and the private sector to accelerate development and testing of new remote sensor capabilities, including accurately measuring chemical and physical attributes of freshwater bodies from unmanned aerial vehicles (drones).

11.3.6 Increase investments in capacity building for use of remote sensing in water resources management applications and decision-making processes, and increase outreach and communication to inform the water resources management community of potential use and application of satellite data, as well as their limitations.

11.3.7 Develop standardized strategies and protocols for quantifying uncertainty in measurements, and communicating the uncertainty to models or decision-making processes that ingest the measurements.

11.4 Advance new water technology to improve efficiencies for the water-energy nexus by implementing the following actions:

11.4.1 Employ smart grid technologies for water and energy conservation, management, and renewable energy technologies for water treatment and transport processes.

11.4.2 Further integrate water and energy planning and research at the statewide level by enhancing and expanding the efforts by the State's key water and energy management agencies that have made important strides in identifying areas where water and energy planning can be integrated.

11.4.3 Develop analytical methods and tools to help incorporate water-energy nexus considerations in local and regional water and energy plans and assessments, and energy and emission reduction benefits into water conservation and alternate supply analysis.

11.4.4 Develop and utilize multiple benefit analysis to determine cost-effectiveness of investments both in water and energy systems.

11.4.5 Develop analytical methods and tools to help evaluate the water demands of energy technologies in the planning process for energy systems and encourage the use of water-efficient cooling technologies in thermoelectric power facilities.

11.5 Advance new water treatment technology by implementing the following actions:

11.5.1 Further develop and deploy more robust general-purpose membranes with an emphasis on lower cost and energy-efficient use and those that remove contaminants not now efficiently removed (e.g., boron, contaminants of emerging concern), for use in seawater desalination, brackish water treatment, and wastewater and water reuse applications, and recovery of beneficial salts and minerals for reuse.

11.5.2 Continue developing energy recovery technologies for application to membrane separation technologies.

11.5.3 Further develop and deploy smart control technologies to ensure more dependable operation of treatment facilities, including water/wastewater treatment facilities that are remotely located (distributed treatment).

11.5.4 Further develop and deploy advanced water-treatment technologies capable of efficient removal from water of pharmaceuticals and personal care products (PPCPs) and emerging organic contaminants (EOCs).

11.5.5 Deploy brine disposal technologies, already used outside of California, on a larger scale for brine disposal into marine environments and inland areas.

11.5.6 Further develop and deploy wastewater cleanup and recycling technologies focused on producing water for drinking, irrigation, processing, groundwater recharge, and other uses.

11.5.7 Develop technologies to reduce chemical use and increase energy efficiency, such as engineered wetlands for wastewater treatment and ecosystem enhancement.

11.5.8 Develop and deploy anaerobic digestion technology that converts manure produced by confined animal operations into a stabilized fertilizer with a considerable fraction of the nitrogen in the inorganic form.

11.5.9 Continue development of disinfection technologies for water that provide better disinfection efficiency for waterborne human pathogens while not creating additional public health or environmental hazards.

11.5.10 Improve technologies for residential point-of-use (POU) and point-of-entry (POE) treatment.

11.6 Advance new water technology to improve watershed management by implementing the following actions:

11.6.1 Improve watershed data and performance modeling, including improvements in the cost and efficiency of data acquisition and modeling, and by providing real-time and continuous watershed data (including surface and groundwater data) to enhance scenario-planning analysis capabilities.

11.6.2 Conduct groundwater recharge area mapping and develop related spatial data and models to identify groundwater recharge opportunities.

11.6.3 Expand the scientific and engineering knowledge base needed for more effective floodplain restoration to promote wetlands development, aid groundwater recharge, provide suitable habitat for aquatic and terrestrial species, and provide a trap for nutrients and sediment.

11.7 Advance new water technologies to improve agricultural water use efficiency by implementing the following actions:

11.7.1 Improve the cost effectiveness and accuracy of on-farm and district-level water measurement devices (flow rate and volume) and soil moisture-sensing technologies to increase water management data accuracy and control and help quantify the efficiency of agricultural water uses.

11.7.2 Develop higher water-efficient irrigation system technologies to help optimize water- and energy-use efficiency, and enable water district deliveries on a real-time basis to maximize on-farm water use efficiency and support drip/micro irrigation methods.

11.7.3 Develop and improve technologies for irrigation scheduling, including remote sensing, weather-based, and/or crop/soil-based technologies.

11.7.4 Develop cost-effective irrigation system monitoring platforms for evaluating irrigation performance criteria in real time, including both water and energy.

11.7.5 Develop the data necessary for identifying opportunities for shared use of water supplies (e.g., water exchanges between agricultural and urban users) and opportunities for local groundwater treatment (primarily salts) as a new or alternate water source for irrigation.

11.7.6 Continue the development of drought-resistant and/or salt-tolerant plant varieties.

11.8 Advance new water technology to improve urban water use efficiency by implementing the following actions:

11.8.1 Promote the continued development of Advanced Metering Infrastructure (AMI) to provide multiple benefits to utilities and their customers, including near real-time water use information and the quicker identification of leaks, thereby promoting more efficient water use (e.g., individual apartments, remote access to water use data).

11.8.2 Incorporate the best available plumbing codes in the development of plumbing code and efficiency standards for low-flow appliances and fixtures, such as toilets, clothes, and dish washers in the home, as well as low-flow cleaning technologies in the commercial and industrial sectors.

11.8.3 Improve the measurement accuracy of outdoor landscape area and its related water use to help improve the efficiency of residential and commercial outdoor water use.

11.8.4 Continue development of the technologies necessary to improve commercial/residential stormwater management with benefits of reduced pollution and runoff and often increased local groundwater recharge.

Objective 12 — Strengthen Tribal/State Relations and Natural Resources Management

> *Strengthen relationships with California Native American Tribes that acknowledge and respect their inherent rights to exercise sovereign authority and ensure that they are incorporated into planning and water resources decision-making processes in a manner that is consistent with their sovereign status.*

Update 2005 recommended that DWR and other State agencies invite, encourage, and assist the participation of tribal government representatives in statewide, regional, and local water-planning processes and to access State funding for water projects. As part of Update 2009, the Tribal Communication Committee prepared the comprehensive *Tribal Communication Plan* (Tribal Communication Committee 2008) for the CWP (as presented in Update 2009, Volume 4, *Reference Guide*). The 10 *Tribal Communication Plan* objectives were included in the Update 2009 related actions. (Refer to the *Tribal Communication Plan* for a definition of California Native American Tribes.)

For Update 2013, a Tribal Advisory Committee was convened, and a Tribal Water Summit for the update was held in April 2013. The summit included the development of the *Guiding Principles and Statement of Goals for Implementation*. This objective incorporates the related actions from Update 2009, the 2013 Tribal Water Summit *Guiding Principles and Statement of Goals for Implementation*, and the 2013 Tribal Water Summit implementation objectives.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

12.1 State government, in collaboration with California Native American Tribes, should, where it is within the State's authority, address tribal water rights, including tribal water rights dating back to time immemorial; federally reserved water rights; jurisdiction; and trust responsibilities, including individual allotments, by:

- 12.1.1 Convening a task force to articulate a consistent State policy and protocol that recognizes tribal water rights in all aspects of water planning, including supply, timing, flows, quality, and quantity.
- 12.1.2 The U.S. Bureau of Indian Affairs and the State Water Resources Control Board (SWRCB), in collaboration with California Native American Tribes, developing joint training on State, federal, and tribal water rights, including trust responsibilities, the implications for different tribal trust lands (reservations, rancherias, and individual allotments) and jurisdiction.

12.2 State government should write legislation and contracts in a way that enables California Native American Tribes to be a lead agency and directly receive and manage State funding (as fiscal agent or otherwise) for water planning and management.

12.3 The California Department of Fish and Wildlife and California Native American Tribes will develop and initiate pilot projects to develop resource management plans, characterized by the integration of Traditional/Tribal Ecological Knowledge and western science. This will include identifying existing examples of partnerships and launching pilot projects.

12.4 State agencies should use Tribal Ecological Knowledge to inform their work and decisions, including establishing baseline resource conditions and developing options to share information in ways that protect specific details about cultural resources.

12.5 State agencies, in collaboration with California Native American Tribes, should develop and conduct trainings for agencies on tribal sovereignty, trust responsibilities, cultural awareness/sensitivity, and Traditional/Tribal Ecological Knowledge by developing a curriculum with a tribal working group, establishing consistent training protocols for all agencies, and initiating trainings.

12.6 State and federal agencies, in coordination with California Native American Tribes, should identify, coordinate, and provide technical training for California Native American Tribes, to increase technical capacity — including, but not limited to, basic training modules (e.g., Basic Inspector Academy, geographic information systems, small water systems operations, such advanced technologies as LiDAR and satellite imagery) — and establish criteria and protocols for ensuring training vendors preferred by California Native American Tribes are utilized.

12.7 State agencies should engage tribal communities in compiling and developing climate change adaptation and resilience strategies that will mitigate climate impacts to their people, waterways, cultural resources, or lands.

12.8 The SWRCB should, in collaboration with California Native American Tribes, propose a statewide beneficial use definition that respects and acknowledges cultural and subsistence use of water and this definition should be adopted in statewide water quality control plans.

12.9 State agencies and California Native American Tribes should utilize and implement communication strategies, protocols, and procedures that are developed and/or implemented by California Native American Tribes, including but not limited to the Tribal Communication Plan, U.N. Declaration on the Rights of Indigenous Peoples, 2013 Tribal Water Summit Guiding Principles and Goals, and tribal memoranda of understanding.

12.10 State agencies, in collaboration with California Native American Tribes, should enhance tribal outreach, communication, coordination, collaboration, and the work of tribal liaisons by identifying and implementing strategies to strengthen tribal involvement in State outreach and engagement approaches; clarify tribal liaison roles and responsibilities; and identify options for creating a statewide network of tribal liaisons to address multiple aspects of tribal concerns (e.g., legal, policy, and local conditions).

12.11 State agencies should engage in meaningful consultation by encouraging and moving toward earlier involvement by California Native American Tribes (at the design/planning stages); initiating consultation for programmatic decisions as well as project-level decisions; understanding individual California Native American Tribes' protocol for consultation, adjusting timelines to allow adequate time to bring items before tribal councils and leaders; conducting meetings on tribal lands; and documenting tribal comments.

Objective 13 — Ensure Equitable Distribution of Benefits

Increase the voice of small and disadvantaged urban and rural communities in State processes and programs to achieve fair and equitable distribution of benefits. Provide access to safe drinking water and wastewater treatment for all California communities and ensure programs and policies address the most critical public health threats in disadvantaged communities.

Update 2005 recommended that DWR and other State government departments and agencies should invite, encourage, and assist representatives from disadvantaged communities and vulnerable populations, and the local agencies and private utilities serving them, to participate in statewide, regional, and local water planning processes and to get equal access to State funding for water projects. State policy establishes social equity and environmental justice (EJ) as State planning priorities to ensure the fair treatment of people of all races, cultures, and income, in particular those having experienced significant disproportionate adverse health and environmental impacts.

To enforce the fair treatment clause, four key requirements must be met:

- Disadvantaged and disproportionately affected communities must be identified and engaged.
- The water-related needs of these communities must be determined and potential solutions developed and funded.
- The impact of water management decisions on these communities must be considered and mitigated.
- All State programs must be evaluated to document progress.

A number of efforts to better address EJ and economically disadvantaged community concerns have advanced since Update 2005.

In 2008, the California Public Resources Code, Section 75005(g), was added to define a "disadvantaged community" (DAC) as a community with a median household income of less than 80 percent of the statewide average. A "severely disadvantaged community" is one with a median household income of less than 60 percent of the statewide average.

The current DWR guidelines for IRWM funding, allocated through voter-approved Propositions 84 and 1E, identify statewide priorities among which is a goal to "ensure equitable distribution of benefits." For implementation grants, DWR has prioritized proposals that:

- Increase the participation of small communities and DACs in the IRWM process.
- Develop multi-benefit projects with consideration given to affected DACs and vulnerable populations.
- Address safe drinking water and wastewater treatment needs of DACs.

In 2012, California Water Code Section 106.3 was added to declare that the established policy of the State recognizes every human being as having the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. All relevant State agencies, including DWR, SWRCB, and CDPH, are required to consider this State policy when revising, adopting, or establishing policies, regulations, and grant criteria when those policies, regulations, and criteria are pertinent to the uses of water described in this section.

Other initiatives have also moved forward, including:

- Final Report to the Governor's Office August 20, 2012, Governor's Drinking Water Stakeholder Group, Agreements and Legislative Recommendations.
- CDPH's Small Water System Program Plan.
- SWRCB's Small Community Wastewater Grant Program.

Even with all these efforts, one of the challenges that State agencies and water systems express about trying to address the needs of DACs is simply answering these two questions: "Who are DACs?" and "Where are DACs?"

The CWP can provide guidance and tools for identifying disadvantaged and EJ communities. It is vitally important to identify community needs. Many water, wastewater, and flood projects are not developed for these communities, and yet they can affect them. It is important to understand that even projects that convey "general" public benefit may not proportionally benefit EJ communities or DACs. For example, conservation programs that depend heavily on toilet and washing machine rebates will have greater penetration in middle- and upper-income communities than they will in poorer communities that purchase less frequently and cannot afford the initial outlay for the fixture. These problems are resolved by taking community concerns into account during the project design phase to ensure equitable benefits.

Another concept that plays into the measurement of impacts is the cumulative effects and incremental burden of a project. It is understandable that water agencies would look at other water projects in determining the impact of their project, but that practice ignores the reality of DACs. That is, these communities endure so many challenges on a daily basis, that one more, from any source, only adds to what may already be an excessive burden.

Finally, planners should develop multi-benefit projects with consideration given to affected DACs and vulnerable populations. This is particularly true in already affected communities. For example, if an agency is developing a flood management project, it would be prudent to look at developing the project in ways that will provide flood protection, as well as open space, wildlife habitat, and/or recreational opportunities, to DACs and vulnerable populations.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

13.1 Ensure implementation of the policy goals of California Water Code Section 106.3 (Assembly Bill [AB] 685), which state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.

13.1.1 State agencies should ensure that the goals established by the policy — safe, clean, affordable, and accessible water adequate for domestic uses — are reflected in agency planning.

13.1.2 State agencies should give preference to actions that advance the policy and strive to avoid taking actions that adversely affect the human right to water.

13.1.3 State agencies should track actions undertaken to promote the policy and make information relevant to the human right to water available to the public.

13.1.4 Governor's Office of Planning and Research (OPR) should provide access to resources defining public participation best practices to State agencies, through its local government roundtable and the OPR Web site. State agencies should implement best practices, within available resources, for public participation in agency decision-making by California's diverse population.

13.1.5 State agencies should facilitate access by rural and urban disadvantaged communities (DACs) and California Native American Tribes to state funds for water infrastructure improvements.

13.1.6 State agencies should ensure the effectiveness of accountability mechanisms protecting access to clean and affordable water.

13.1.7 In consultation with State agencies, OPR should provide guidance and/or guidelines to inform and assist State agencies in implementing California Water Code Section 106.3 (AB 685).

13.1.8 State agencies are encouraged to review their policies, regulations, and funding criteria for consistency with California Water Code 106.3 (AB 685).

13.2 Increase environmental justice (EJ) and DAC participation in State agency water-related planning, programs, processes, and projects.

13.2.1 The California Department of Water Resources (DWR) and the other California Water Plan (CWP) State Agency Steering Committee members should incorporate EJ issues of precautionary applications, cumulative health impact reductions, public participation, community capacity building and communication, and meaningful participation in current and future CWP update processes and other programs.

13.2.2 DWR grant and loan recipients should demonstrate participation by DACs and vulnerable populations and their advocates to seek their participation in water planning programs, including the CWP update and integrated regional water management (IRWM) plans and other local water planning processes.

13.3 Support financial mechanisms to facilitate improved and sustainable wastewater removal systems.

13.3.1 The State Water Resources Control Board (SWRCB) and DWR should establish incentives for substandard septic or small wastewater systems to connect with municipal, regional, or other upgraded wastewater systems.

13.3.2 Local and regional agencies should be encouraged to establish introductory, then graduated, wastewater rates to allow a period of adjustment for new and affordable rates.

13.3.3 DWR, the California Department of Public Health (CDPH), SWRCB, the California Public Utilities Commission (CPUC), and other State agencies should evaluate and create a consistent metric for water affordability.

13.4 Remove barriers to local and regional funding for water projects conducted to support DAC and EJ communities.

13.4.1 The SWRCB, CDPH, DWR, and other State agencies should work with DACs and vulnerable populations and their advocates to review State government funding programs and develop or revise guidelines that make funding programs more accessible to DACs and EJ communities.

13.4.2 The SWRCB, CDPH, DWR, and other State agencies should implement and expand technical assistance programs developed in collaboration with DAC/EJ communities and their advocates to provide them with resources, expertise, and information leading to more successful access to funding.

13.5 Provide incentives for the consolidation, acquisition, or improved management of small water systems.

13.5.1 CDPH should establish incentives for large water systems to consolidate with small water systems or others without access to safe drinking water.

13.5.2 CDPH should encourage drinking water providers and other governmental and non-governmental entities to conduct outreach and education for customers and shareholders regarding proposed consolidations.

13.5.3 CDPH should support efforts to improve licensing and training options for small water system operators.

13.6 CDPH should continue to implement its Small Water System Program Plan to assist small water systems (especially those serving DACs) that are unable to provide water that meets primary drinking water standards.

13.6.1 CDPH should share the Small Water System Program Plan with relevant federal, State, and local agencies, as well as stakeholders, to foster additional opportunities for funding, coordinate construction projects in communities, and assist in local and regional planning efforts.

13.6.2 CDPH should utilize geographic information system (GIS) tools to identify large water systems in close proximity to targeted small water systems, and conduct targeted outreach to these large water systems to encourage them to consolidate the small systems into their service area.

13.6.3 CDPH should work with stakeholders to identify obstacles to consolidation (including financial, legal, and local issues) and develop possible actions to address these obstacles.

13.6.4 Relevant State agencies should cooperate with local agencies in efforts to specifically determine and address the water infrastructure needs of individual domestic well users and small water systems with less than 15 connections.

13.6.5 CDPH should seek input from other states and the federal government on innovative, successful efforts to address the needs of small water systems, and

should share its results on implementation of its Small Water System Program Plan.

13.7 State and federal agencies should coordinate to better address water-related problems in DACs and vulnerable populations.

13.7.1 State and federal agencies should coordinate to better collect and maintain data on EJ communities and DACs.

13.7.2 The SWRCB, CDPH, DWR, and other State and federal agencies should coordinate their review of current monitoring and regulatory programs to identify and address gaps in available data and monitoring programs that affect DACs and vulnerable populations.

13.7.3 CDPH, DWR, and SWRCB should initiate more data collection, study, and analysis to develop options, recommendations, strategies, and programs to assist DACs.

Objective 14 — Protect and Enhance Public Access to the State's Waterways, Lakes, and Beaches

Protect and enhance public access to the state's waterways, lakes, and beaches for cultural, recreational, and economic purposes consistent with maintaining healthy ecosystems.

Public access to our natural waterways, lakes, and beaches has been embedded in the California's Constitution since the founding of the state. Activities such as boating, fishing, exploring the beach, and swimming are an important part of our heritage, our culture, our identity, and our economy. California's Legislature has repeatedly acknowledged the importance of developing the state's water resources to provide more public access and more recreational opportunities through our water supply, watershed protection, and flood management projects. The rich variety of recreation opportunities created by the state's natural, managed, and constructed water bodies supports public health and welfare, sustains healthy businesses and communities, and promotes wise use of our abundant natural resources. Critical to maintaining California's heritage is the need to protect and enhance public access to the state's waterways, lakes, and beaches for the foreseeable future. Doing so will require the development and implementation of related actions that guide decision-makers tasked with managing the state's waterways, lakes, and beaches.

The related actions below are a compilation of guidance from strategic planning documents for agencies as diverse as California State Parks, the Sierra Nevada Conservancy, and the Delta Stewardship Council. This is a new objective for the CWP, so it is expected that the related actions and performance measures will become more comprehensive as more agencies with public access responsibilities participate in the next CWP update. More information on this subject is available in Volume 3, Chapter 31, "Water-Dependent Recreation."

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action. These related actions are also supported by additional recommendations in Chapter 30, "Water and Culture," and Chapter 31, "Water-Dependent Recreation," of Volume 3, *Resource Management Strategies*.

Related Actions

14.1 Respect and Protect. State government will respect and vigorously protect waterways, lakes, and beaches for beneficial public use.

- 14.1.1 The State will support the regulatory responsibilities of the California Coastal Commission (beach access), Bay Conservation and Development Commission (San Francisco estuary access), State Water Resources Control Board (SWRCB) (water quality and supply), State Lands Commission (navigation), California Department of Fish and Wildlife (DFW) (inland fisheries), and others that protect beneficial uses such as fishing, boating, and other public access rights.

- 14.1.2 State conservancies — such as the Sacramento-San Joaquin Delta Conservancy, Tahoe Conservancy, and Sierra Nevada Conservancy — should acquire and/or protect sensitive landscapes, such as key watershed lands and wetlands,

flood conveyance zones, riparian woodlands, and vernal pools with important natural resource and scenic values, and significant beneficial public uses. The conservancies, including the State Coastal Conservancy, should protect and/or acquire land to maintain public access to waterways, lakes, and beaches.

14.1.3 The State should protect recreational resource values threatened by the effects of climate change by using strategies of reinforcement, adaption, and/or retreat as feasible.

14.1.4 As water resources are developed, flood management facilities are envisioned, and sea level rise is accommodated, State government, including, but not limited to, the California Department of Water Resources (DWR) and the California Department of Transportation, should protect and minimize impacts on cultural and recreational uses.

14.2 Research and Planning. State government should engage in statewide research and planning to meet California's unmet and growing demand for safe public access to waterways, lakes, and beaches.

14.2.1 State agencies, such as the California Department of Parks and Recreation (California State Parks) and DWR, should document and regularly report on the water-dependent recreational trends of California's growing population, the public health and economic benefits of recreational activities, and threats to the tourism and lifestyle benefits of California's water-dependent recreational infrastructure.

14.2.2 State agencies, such as California State Parks and DWR, should report on the feasibility of incorporating public access facilities into each water resources development and flood management infrastructure project, watershed protection efforts, and environmental restoration projects funded by the State and federal governments. Consider multi-benefit projects that increase waterfront accessibility, create more inclusive access opportunities, support commercial and recreational fishing, encourage economic revitalization, promote excellence and innovation in urban design, enhance cultural and historic resources, and are resilient to a changing climate. Plan to include, where feasible, levee crown widening in levee improvement projects to accommodate multi-purpose recreational trails and bike lanes.

14.2.3 State conservancies, such as the State Coastal Conservancy, Bay Conservation and Development Commission, and California State Parks should collaborate with local agencies to systematically plan to reinforce, adapt, and/or relocate recreational opportunities threatened by sea level rise and transportation or wastewater infrastructure adaptations.

14.2.4 California State Parks should lead comprehensive recreation resource planning of the state's inland waterways, engaging the public, recreation providers, policy-makers, advocacy groups, and public officials. Consider facilities that provide opportunities for the top outdoor recreation activities identified in the *Survey of Public Opinions and Attitudes on Outdoor Recreation in California*, especially those benefiting disadvantaged communities.

14.3 Enhance. All State agencies with public access responsibilities should, in concert with local agencies, enhance safe public access by providing water-dependent recreational facilities and programs that support beneficial uses, and/or improve the social and economic sustainability of federally funded and State-funded infrastructure, watershed protection, and environmental restoration projects.

14.3.1 State agencies, including DWR, California State Parks, and all state conservancies, should facilitate and/or construct water-dependent recreation projects that spur the economic development of disadvantaged communities, provide environmental stewardship benefits, enhance natural resource values, protect or relocate existing recreational opportunities, and meet the regional demand for healthy outdoor recreation opportunities for all Californians, especially children.

14.3.2 The Delta Protection Commission and Sacramento-San Joaquin Delta Conservancy should encourage partnerships between other State and local agencies, local landowners, and business people to expand water-dependent recreation and tourism in the Delta and Suisun Marsh, while minimizing adverse impacts on non-recreational landowners. Use California State Parks' *Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh* and the Delta Protection Commission's *Economic Sustainability Plan* as guides.

14.3.3 As California's population increases, State agencies, such as DWR, DFW, and California State Parks, should increase water-dependent recreation opportunities on existing public land, where feasible. State government should also pursue acquisition opportunities that provide open space and public access to water features, such as the ocean, lakes, rivers, streams, and creeks, where demand exceeds supply.

14.3.4 State agencies should prioritize construction of water-dependent recreation facilities identified in integrated regional water management (IRWM) plans; active-use facilities, such as multi-use trails for equestrians, hikers, walkers, and bikers, which improve public health; boating trails; facilities that mitigate or adapt to climate change; facilities that increase the safety of anglers, swimmers, and boaters; and facilities that provide environmental education, such as water conservation and water quality information.

14.4 Promote. All State agencies with waterfront public access responsibilities should cooperate with local agencies, businesses, and the general public to promote healthy outdoor recreation, resource-based tourism, and environmental stewardship to benefit public health and welfare, improve the environment, and grow the economy commensurate with protection of public property rights.

14.4.1 All State conservancies, DWR, DFW, and California State Parks should improve outreach and education to children and in disadvantaged communities that will improve public health, support California's outdoor lifestyle, and promote wise use of water resources.

Objective 15 — Strengthen Alignment of Land Use Planning and Integrated Water Management

Strengthen the alignment of goals, policies, and programs for improving local land-use planning and IWM.

The way in which we use land has a direct relationship to agriculture, water supply, water quality, flood management and hazard mitigation, and other water topics. For example, compact urban development patterns in urban areas can reduce water demand, improve water quality, limit the amount of development in floodplains as well as avoid conversion of agricultural lands, reduce costs for water-related infrastructure, and reduce GHGs. Also, directing development away from agricultural lands allows for multi-objective management of those lands, which includes agricultural land stewardship, floodplain management, water quality improvement, and habitat conservation.

Cities and counties have primary responsibility for land use planning and regulation in California. Land use planners consider water throughout the local land-use planning process, and water is a critical element in adopting sustainable land-use planning policies. Stronger collaboration between land use planners and water planners can promote more sustainable land-use patterns and greater integration of IWM into local land-use plans. It can also lead to IRWM plans that more accurately reflect and support local government land use and growth policies.

State government has an important role to play in strengthening the alignment of land use and IWM. Existing programs include SB 610 and SB 221 of 2001, which establish processes for coordinating land use and water supply planning. Also, State flood legislation enacted in 2007 requires local general plans to include specific policies to reduce flood risk. Established in 2008, the Strategic Growth Council awards grants for sustainable communities planning, which can integrate IWM at both the regional and local levels.

By enhancing its role, State government can facilitate stronger collaboration between land use planners and water planners. It can provide additional regulatory and financial incentives for local and regional plans that integrate IWM through encouraging compact, sustainable development patterns. Finally, State government can provide technical tools and data resources to make it easier for local governments to prepare land use plans that integrate IWM. Recently DWR partnered with Sonoma State University's Center for Sustainable Communities to develop an "Integrated Water and Land Management Tool." The final report, summary, user guide, and tool are available at the following Web links:

- Final Report — http://www.waterplan.water.ca.gov/docs/cwpu2013/vol4/landuse-DWR-Report-October15-2013-2.pdf.
- Summary and User Guide — http://www.waterplan.water.ca.gov/docs/cwpu2013/vol4/landuse-DWR-SummaryUserGuide-Oct-15-2013.pdf.
- Tool (Microsoft Excel Calculator) — http://www.waterplan.water.ca.gov/docs/cwpu2013/vol4/LandUse-toolcalculator.xls.

The land use resource management strategies (RMSs) are cross-referenced to many other RMSs, including Agricultural Land Stewardship (ALS). In furtherance of aligning land use planning and water, the land use objective incorporates ALS-related actions, including the comprehensive toolbox and "Framework" in the ALS RMS that can inform agricultural land stewardship

activities at different levels of planning. These strategies can be used in developing projects that affect agricultural land by providing an integrated and collaborative framework to address changing uses of agricultural land, from mitigating its loss to valuing its multiple benefits. For more information, see https://agriculturallandstewardship.water.ca.gov/.

Many decision-makers in local, regional, and State government believe strengthening the links between land use planning and ALS are essential to achieving the CWP vision and IWM. To that extent, project investments in floodplain management, land use planning, and agricultural and economic viability with environmental and habitat benefits are consistent with State and regional polices.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action. These related actions are also supported by additional recommendations in Chapter 21, "Agricultural Land Stewardship," and Chapter 24, "Land Use Planning and Management," of Volume 3, *Resource Management Strategies*.

Related Actions

15.1 State Government should provide additional regulatory and financial incentives to developers and local governments to plan and build using compact and sustainable development patterns.

- 15.1.1 Regulatory incentives include further streamlining of California Environmental Quality Act (CEQA) review for infill projects and further reductions in brownfields liability for innocent purchasers.
- 15.1.2 Financial incentives include developing criteria for State grant and funding programs that incentivize compact and sustainable development.

15.2 The Governor's Office of Planning and Research (OPR) should provide guidance and financial incentives for integration of integrated water management (IWM) considerations in general plan updates and Sustainable Communities Strategy (SCS), including both substantive and planning process guidance.

15.3 Local governments should integrate relevant IWM considerations into their general plan updates. IWM considerations relevant to land use planning include water supply, water quality, flood risk management, agricultural land stewardship, and climate policies (mitigation and adaptation).

15.4 The Strategic Growth Council should provide guidance and financial incentives for regional planning agency integration of relevant IWM considerations into SCSs, transportation blueprint plans, and other regional plans.

15.5 Regional planning agencies should integrate IWM considerations into their SCSs, transportation blueprint plans, and other regional plans.

15.6 Local governments should ensure that urban water management plans inform and reflect integrated regional water management (IRWM) plan preparation and implementation, to

further IWM integration in local land-use planning that promotes compact and sustainable development.

15.7 Local governments should implement specific land-use planning and regulatory measures to reduce flood risks, consistent with IWM principles and best management practices (BMPs) for land use planning.

15.7.1 Measures include preservation of existing floodplains, aquifer recharge areas, and alluvial fans; restoration of natural floodplain functions; and design measures to increase post-flood resiliency. See Objective 6, Related Action 6.8 regarding the process for developing land use planning BMPs.

15.8 The California Department of Water Resources (DWR) should assist local governments and developers with implementing the *Integrating Water and Land Management: A Suburban Case Study and User-Friendly, Locally Adaptable Tool*, which calculates life-cycle water infrastructure costs for different development patterns.

15.9 State government should evaluate the effectiveness of the 2007 flood management legislation in achieving coordination of land use planning, flood planning, and natural resources. State government should recommend changes to existing laws and their implementation to increase their effectiveness as appropriate.

15.10 State government, in collaboration with local government, non-governmental organizations, and stakeholders, should evaluate the effectiveness of SB 610 and SB 221 in coordinating land use and water supply planning, and recommend changes to existing laws and their implementation, as appropriate.

15.11 State government should invest in innovation and technology for assessment of land use, water supply, and flood conditions to further integrate water management and land use.

15.11.1 State government should provide funding, technical information, and BMPs, and publicize accurate and relevant water resources information for use by local governments and developers. State government could serve as an information clearinghouse for regional water supply, water quality, flood management, agricultural land stewardship, and climate change vulnerability information that local governments can use in preparing general plans and evaluating development applications.

15.12 Agricultural Land Stewardship should be considered for plans and projects that affect agriculture.

15.12.1 State government should provide leadership on promoting a common approach for State agencies with regard to plans and projects affecting water management and agriculture that takes into consideration the multiple uses of the land, including agricultural production, flood protection, habitat conservation and restoration, and water supply benefits.

15.12.2 Plans and projects affecting water management and agricultural lands should consider developing an agricultural land stewardship plan and as appropriate use the toolbox of agricultural land use strategies identified in the agricultural land stewardship resource management strategy.

15.12.3 State government should work with others to assure that State and federal funding criteria consider incorporating agricultural land stewardship strategies for land use plans and projects affecting agricultural lands.

Objective 16 — Strengthen Alignment of Government Processes and Tools

> *Improve, align, and transform processes and administrative tools (incentives and oversight) — at all levels of government — used for water planning, public engagement, program/project implementation, and policy- and regulation-setting to advance IWM.*

As water managers move to IWM, regulatory and other requirements designed to achieve actions with a single management objective can appear to work at cross purposes. Multi-benefit projects may require complex considerations that balance needs and trade-offs. In addition, IWM project implementers often report that they must navigate what seems to be a labyrinth of laws, regulations, and permits that sometimes leads to project delays and mounting planning and compliance costs. These impediments can ultimately create significant difficulties in meeting public safety, environmental stewardship, or economic goals. This objective seeks to establish an approach to assist in aligning activities, honor regulatory goals, and facilitate successful implementation of projects.

The need for improved government alignment is being recognized at all levels of government and in multiple planning processes. For example, the Strategic Growth Council, California Water Commission, Resource Conservation Districts, Water Plan State Agency Steering Committee, California Biodiversity Council, and IRWM Regional Water Management Groups all have stated that the following issues impede broader and better implementation of IWM projects:

- Uncoordinated and fragmented water governance and responsibilities among numerous federal, tribal, State, and local agencies and organizations.
- Patchwork of unaligned agency planning, programs, projects, policies, and regulations.
- Unintended consequences from mismatching or conflicting policies or regulations.
- Inadequate sharing of data, information, and knowledge resulting from institutional silos.
- Duplication of effort, expertise, and resources.
- Focus on single-purpose projects.
- Inadequate partnerships among federal, State, tribal, local, private,
- Project delays and mounting planning and compliance costs.

Understandably, project planning in California is technically complex and location-appropriate because of wide variations of climates, landforms, and institutions, as well as a diverse, place-based range of cultures associated with rural, suburban, and urban communities. Project partners, such as implementers and regulatory agencies, may have different perspectives on what they hope a project or program should achieve. Those responsible for operations and maintenance may have yet another perspective. Also, State and federal agencies may have different perspectives and responsibilities regarding a project.

The need for alignment is well understood among all levels of government and stakeholders. This CWP objective of strengthening agency alignment is based on several key principles:

- Agencies will remain autonomous.
- Action will be voluntary.
- No new institutions or organizations will be created to manage alignment.

- Action will occur at multiple organizational levels.
- No single agency can solve all of a project's or program's issues by itself.

Implementing the related actions for this objective, in coordination with other CWP objectives, will help achieve the following outcomes:

- Improved communication, coordination, and collaboration.
- Aligned planning, programs, projects, policies, and regulations for water and associated watershed, land, and ecosystem management.
- Shared processes, tools, data, information, knowledge, and expertise.
- Collaborative, place-based solutions using best available science, traditional knowledge, and other sources of information.
- Watershed-scale, multi-benefit water and resource stewardship programs to solve multiple resource issues.
- More public-private partnerships to advance all aspects of IWM (planning, project implementation, financing, monitoring, maintenance, data collection and exchange, analytical methods and tools, research, technology, and science).

A primary purpose for improving communication, cooperation, collaboration, and alignment among government agencies is to expedite efficient and cost-effective implementation of resource management strategies and multi-objective projects. This includes collaboration with regulatory agencies to reduce time and avoid costs to implement IWM projects while protecting and enhancing natural resources. Achieving IWM requires that data management, planning, policy-making, and regulation occur in a very collaborative, consistent, and regionally appropriate manner.

Instead of creating new institutions or organizational structures to manage alignment, agencies are encouraged to utilize simple self-organizing principles, practices, and tools to coordinate and collaborate outside of traditional silos and hierarchical management approaches. Alignment should not alter agencies' authority or responsibility, and is achieved by agencies working together — early and often. For example, a collaboration has been established between the 42-member California Biodiversity Council (http:www.biodiversity.ca.gov) and the Update 2013 process to better align planning processes and more efficiently interact with federal, State, and local agencies. One result was a joint convening of the Workshop to Align Agency Conservation Plans, Policies, and Programs held in October, 2012. The outcome of this workshop led to the February 6, 2013, California Biodiversity Council Meeting in Davis, California, where the co-chairs committed to a new resolution for the Council, *Strengthening Agency Alignment for Natural Resource Conservation*, described further in Chapter 4, "Strengthening Government Alignment."

One of the related actions offers strategies for improving the alignment, effectiveness, and implementation of water regulations. It recommends agencies set regulations that focus on regionally appropriate outcomes (goals or targets — the What), establish performance measures/indicators to evaluate progress, and include an adaptive management approach as a part of compliance. The action also recommends that the regulatory agency give regional collaboratives, such as the IRWM Regional Water Management Groups or Resource Conservation Districts, an option to develop an implementation and monitoring plan that

describes the resource management strategies the group will use to achieve the regulations' intended outcomes in their area of the state (the How).

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

16.1 To advance integrated water management (IWM), federal, State, tribal, and local government agencies should strengthen alignment among their data, plans, programs, policies, and regulations. More specifically, they should:

- 16.1.1 Collaborate to develop consistent policies for advancing IWM at a regional scale, and use a broad and diverse mix of administrative tools to implement their policies, including technical assistance and data support; financial incentives; and State funding, guidelines, and regulations.
- 16.1.2 Adopt the "Strengthening Agency Alignment for Natural Resource Conservation" resolution (April 2013) vision, goals and principles, developed with extensive input from 42 federal and State agencies, including multiple Water Plan State Agency Steering Committee members, among others.
- 16.1.3 Utilize the best practices and tools recommended in the "Strengthening Agency Alignment for Natural Resource Conservation" resolution.
- 16.1.4 Participate on the Biodiversity Council's Interagency Alignment Team.

16.2 State government should more effectively coordinate the work of multi-agency collaboratives, and utilize them to align and implement State water policies and promote IWM. This should include developing and maintaining a shared and easily accessible interagency inventory/repository of processes and tools for strengthening government agency alignment. Examples of multi-agency collaborative include, but are not limited to, the Strategic Growth Council, California Biodiversity Council, Delta Stewardship Council, Ocean Protection Council, Water Plan State Agency Steering Committee, Conservancies and Resource Conservation Districts, California Council on Science & Technology, and California Landscape Conservation Cooperative.

16.3 State government agencies should hire, assign, or train staff with collaboration and conflict resolution knowledge, skills, and abilities (KSA), whose primary job is to work with other federal, State, tribal, regional, and local agencies, organizations, and communities to improve interagency communication, cooperation, collaboration, and alignment.

- 16.3.1 California Department of Human Resources (Cal-HR) should convene an interagency working group to develop standard language describing collaboration and conflict resolution KSAs for use in duty statements where this core competency is a minimum qualification.
- 16.3.2 State agencies should include this standard KSA language in duty statements for staff and management classifications to promote State agency collaboration

and alignment, and they should require incumbents in these classifications to complete facilitation training.

16.3.3 State agencies should be encouraged to build internal support, provide necessary training, and provide clear direction to staff to meet the objective of improving, aligning, and transforming processes and administrative tools.

16.4 Federal and State government agencies should use a more inclusive, collaborative, and outcome-based approach for setting consistent and aligned water policies and regulations that are regionally appropriate. More specifically, they should:

16.4.1 Recognize regional and local diversity by assisting, enabling, and empowering regional water collaboratives, such as Regional Water Management Groups (IRWM) and Resource Conservation Districts, to determine how State water policies are implemented in their planning regions and/or watersheds.

16.4.2 Focus on intended and regionally appropriate outcomes (goals and objectives) when setting water policies, regulations, guidelines, and resource management plans for California. Agencies should establish performance measures/indicators to evaluate progress toward achieving desired outcomes, and include an adaptive management approach as a part of regulatory compliance.

16.4.3 Provide a voluntary program for regional collaboratives, such as Regional Water Management Groups (IRWM) and Resource Conservation Districts, to develop an implementation and monitoring plan that describes the resource management strategies (actions) the group will implement to achieve the regulations' intended outcomes in their planning regions and/or watersheds, as appropriate for their local conditions and resources.

16.4.4 Utilize voluntary, outcome-based and system-scale (watershed and ecosystem) approaches for regulatory and permitting processes, and engage project proponents collaboratively, earlier and more often during the process.

16.4.5 The California Department of Water Resources (DWR) and other State agencies should survey regional collaboratives, such as Regional Water Management Groups (IRWM), to determine what technical assistance they need to facilitate collaboration and support change in regulatory approaches.

16.5 State government should convene regulatory working groups, in collaboration with federal, tribal, and local governments, to improve and streamline regulatory review and permitting processes for implementing IWM projects more expeditiously. These regulatory working groups should take the following actions in collaboration with regional stakeholders, while recognizing the unique differences among California's geographical regions:

16.5.1 Identify critical resource needs of regulatory agencies necessary to adequately implement regulatory programs and proposed regulatory alignment actions to support IWM, including science, tools, data, policy, guidance, and agency personnel.

16.5.2 Maximize the use of existing mechanisms such as habitat conservation plans and natural community conservation plans.

16.5.3 Review and streamline permit processes to improve efficiency and reduce costs, delays, inconsistencies, and associated adverse impacts, and develop regional permitting processes for recurrent actions and operation and maintenance activities.

16.5.4 Develop and adopt region-specific guidance on ecosystem restoration, water quality improvement, and environmental stewardship strategies to expedite review.

16.5.5 Develop and adopt specific guidance to expedite emergency response and public safety projects for high-risk areas.

16.5.6 Evaluate and adjust regulatory staff assignments to improve regulatory review and permitting processes at a regional scale, facilitate earlier staff involvement in planning phases for complex projects, and identify resource gaps.

16.5.7 Compile, maintain, and utilize regional knowledge bases (data, information, and science), including information on endangered species, sensitive habitat, water quality, and other baseline information.

16.5.8 Develop and maintain regional environmental mitigation databases and mitigation banks to address the varying mitigation requirements among multiple regulatory programs and agencies in each region and across regions.

16.5.9 Develop a multi-agency permitting guidebook that includes a description of the relevant permits, permit applications, and permitting guidance for common and more routine IWM projects.

Objective 17 — Improve Integrated Water Management Finance Strategy and Investments

State government uses consistent, reliable, and diverse funding mechanisms with an array of revenue sources to support statewide and regional IWM activities. State government also makes future investments in innovation and infrastructure (green and grey) based on an adaptive and regionally appropriate prioritization process.

This objective and the related actions are based on collaboration involving several State agencies, advisory committees, topic-based caucuses (particularly the Update 2013 Finance Caucus), and other CWP stakeholders who, together, developed a Finance Planning Framework (Framework), a new feature of the CWP. The Framework provides a logical structure and sequence for financial plan development. The related actions in this section were developed to respond to and leverage the challenges and opportunities that emerged during the Update 2013 finance planning effort, as detailed in Chapter 7, "Finance Planning Framework."

The scope of the related actions is limited to IWM programs and projects directly administered by the State, as well as future State IWM loans and grants distributed as incentives to regional and local governments. These actions are intended to inform and guide State government investment and finance. They are not intended to direct regional or local finance decisions. They also are not intended to modify existing State investment frameworks for ongoing financial activities, such as distribution of currently authorized General Obligation bonds. While the actions below include recommendations for enhancing the way the State invests in IWM, they do not include recommendations for new revenue sources. Chapter 7 and Related Action 17.7 provide a path for resolving issues and filling information gaps, which is required as a precursor to proposing new or enhanced revenues.

Continuing to use and advance the Update 2013 Framework will enable stakeholders to collectively and in context consider the issues to be addressed and the decisions to be made. The Framework discussed in Chapter 7 evolved as stakeholders worked together to create a common understanding of California's water financing picture. Using a storyboard format, the goal was to establish a financing baseline and shared meaning about the past and current situation.

The related actions are intended, in part, to incorporate several aspects of the Framework in State government actions. For example, the Shared Finance Values for State Investment and Prioritization have been represented, where appropriate. These values were developed collaboratively through the Update 2013 Finance Caucus and, in addition to guiding the development of the related actions, are to be used in guiding IWM decisions regarding investment of State government funds. Another overlying purpose of these related actions is to increase the certainty that investments will achieve the intended benefits, improve the return on State investment, and enhance accountability by:

- Increasing the reliability, predictability, and level of State IWM funding for statewide and regional water programs and projects.
- Providing a consistent method for allocating, awarding, and disbursing State funding for water innovation and infrastructure programs and projects.
- Avoiding the use of funding earmarks.

- Including regional accounts to continue IRWM to increase flexibility, reflect local and regional conditions, and advance regional goals and investment priorities.
- Providing proactive planning that implements consistent rules and standards for allocating State funding.

In addition, performance measures, lead entities, current funding status, and whether legislation is required to complete the related actions below have been identified. This supporting information is presented in a table in Volume 4, *Reference Guide*, titled "California Water Plan Related Actions and Performance Measures," and will be used to track the future progress of each related action.

Related Actions

17.1 Regional and local entities should continue investing in integrated water management (IWM) activities, based on regional and local conditions, goals, priorities, and solutions. Reliable and effective water-finance planning should continue at the regional and local levels in partnership with State government. Locally sponsored initiatives will continue to be a cost-effective approach for planning and implementing IWM innovation and infrastructure (green and grey) to provide multiple benefits to their respective jurisdictions. Regional and local investments should be augmented and amplified with federal and State public funding.

17.2 State government should continue to provide incentives for regional IWM (IRWM) activities that achieve State goals or provide broad public benefits. This includes assisting regions technically and financially to develop and implement their IRWM plans and/or help achieve State government goals and interests. State government should continue to enhance incentives for regional activities and invest in infrastructure (green and grey) that provides a public benefit *and* would not otherwise be cost effective.

17.3 State government should improve and facilitate access to federal and State public revenue sources.

17.3.1 State government should develop a central online resource catalog to describe different funding programs, potential IWM revenue sources, and a how-to guide explaining how to apply for funding from these programs.

17.3.2 State government should provide guidance and assistance to local agencies on how to apply for funding that includes technical and financial assistance, as well as training for regions that do not have the capacity or resources to apply for funding or manage grants.

17.3.3 State government should inventory federal funding sources and provide guidance for partnering with, or leveraging, federal funding.

17.4 The governor and the Legislature should broaden the ability of (and create guidelines and limitations for) public agencies to partner with private agencies, entities, and organizations for IWM investments.

New policies are required to overcome the following limitations that have restricted their use:

- Private financing rates are generally higher due to tax effects. Local bond financing options would typically be tax exempt for the bondholder and therefore have lower interest rates.
- The prohibition of their use for State government projects restricts public-private partnerships (P3s) to local projects.

17.5 State government should develop a more reliable, predictable, and diverse mix of finance mechanisms and revenue sources to continue to invest in IWM innovation activities and infrastructure (green and grey) that have broad public benefits, including, but not limited to, General Funds and General Obligation bonds. An important role of State government is to invest in innovation activities having broad public benefits that include improving State water governance, improving water planning and public engagement, strengthening government agency alignment, enhancing information technology (data and analytical tools), advancing water technology and science, and investing in infrastructure (green and grey). These activities should be conducted in collaboration with the ongoing regional and local innovation activities.

Finance mechanisms used for these IWM innovation activities should:

A. Improve cost effectiveness, efficiencies, and accountability.

B. Avoid stranded costs and funding discontinuity.

C. Leverage funding across State government agencies.

D. Increase certainty of desired outcomes.

E. Enable prioritization based on shared funding values, defined principles, goals, objectives, and criteria.

17.6 State government should reduce planning and implementation time frames and costs associated with IWM activities by clarifying, aligning, and reducing redundancies among State government agencies' policies, incentive programs, and regulations.

17.6.1 Develop the scope and methodology and prepare a Return on State Government Investment report card through the California Water Plan update collaborative process (5-year interval) that would track the occurrence of benefits/value derived from State government investments (and leveraged local investments) by using specific criteria and sustainability indicators.

17.6.2 Convene an interagency IWM finance alignment group that includes State planning, resource management, and regulatory agencies to identify and implement finance policies, procedures, and protocols for the enhancement of State government transparency, accountability, flexibility, and cost efficiencies. This finance alignment group would recommend ways to reduce duplication and fragmentation among State government agencies' policies, incentive programs, regulations, and budgets.

17.7 The California Water Plan Update 2018 process will refine and advance the eight components of the Finance Planning Framework as described in the "Next Steps" section

of Chapter 7, "Finance Planning Framework." Future work will cover each component of the Framework in the following ways:

A. IWM Scope and Outcomes (Component 1) — Revisit, clarify, and adapt the scope of IWM to changing conditions and priorities.

B. IWM Activities (Component 2) — Develop more specificity regarding the types and levels of activities that State government should invest in with a clearer nexus to the types of anticipated benefits.

C. Existing Funding (Component 3) — Continue to compile and synthesize data that tracks historical water-related expenditures across federal, State, and local governments in California.

D. Funding Reliability (Component 4) — Work with the State Agency Steering Committee to identify where potential funding gaps exist between the State IWM activities described in component 2 and existing funding levels and sources. Collaborate with regional water management groups to do the same for regional and local IWM activities.

E. State Role and Partnerships (Component 5) — Continue to clarify and elaborate on the role of State government to support a more specific description and estimate of future costs.

F. Future Costs (Component 6) — Estimate future funding demands by (a) launching IRWM, city, county, and special district data pull; and (b) work with State Agency Steering Committee to estimate the funding demand for existing and future IWM activities.

G. Funding, Who and How (Component 7) — Continue to collaborate with stakeholders and federal, State, tribal, and local governments to investigate and develop solutions that address the facts and findings detailed in Chapter 7, "Finance Planning Framework." This work will include, but will not be limited to:

   i. Funding methods that provide a consistent financing framework for State government investments in IWM.
   ii. A prioritization method and rationale for apportioning IWM investment by the categories and subcategories developed in the California Water Plan Update 2013 Finance Planning Framework (i.e., Innovation and Infrastructure activities).
   iii. Methods for enhancing stewardship of State government monies at both statewide and regional scales, including strategies to improve the transparency and accountability of State fund disbursements and their outcomes.
   iv. Achieve the improvements described in Related Action 17.5.

H. Tradeoffs (Component 8) — State government should develop a Decision Support System (DSS) to provide guidance and leadership for defining uncertainties of future costs, benefits, prioritization, and other tradeoffs. The DSS would inform prioritization of State government expenditures, estimation of expected IWM benefits, and methods for apportioning costs across investors and financiers. It also includes developing

a clear and consistent methodology for identifying and quantifying public benefits associated with the entire range of IWM activities.

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